MANAGING GLOBAL SUPPLY CHAIN CAPABILITIES: THE ROLE OF INFORMATION SHARING

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2017

MANAGING GLOBAL SUPPLY CHAIN CAPABILITIES: THE ROLE OF INFORMATION SHARING

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THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF PHILOSOPHY

FACULTY OF BUSINESS AND ACCOUNTANCY
UNIVERSITY OF MALAYA
KUALA LUMPUR

2017

UNIVERSITY OF MALAYA
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ABSTRACT

Over the past decade, many global supply chains have experienced a shift in which large and emerging economies are playing prominent roles as exporters, with Asia represented as among the higher exporters of intermediate goods to European Union and North America. Within the context of Malaysia, the development and growth of the local manufacturing sector was so rapid since the late 1990s; with the industry account for a significant proportion of Malaysia's total exports. With increased uncertainty of global supply chains, export demand from the advanced economies is expected to be less buoyant. The integration of Malaysian into international markets entails the local firms to comply with stricter quality regulations and produce technology-intensive goods, which may impede their participation. The emerging trend of the Trans-Pacific Partnership Agreement (TPPA) further is expected to create more competition and challenges for the Malaysian local companies, as a result of the removal of impediments to trade, which would encourage greater imports. Both critics and supporters of the TPPA contest the Malaysia's readiness to take advantage of its export, as many of the key-sectors are low on value addition. Due to this reason, the local manufacturing firms need to be able to develop effective management practices to help them in competing globally and to be more secure in times of economic crisis.

Despite the growing importance of developing countries' participation including Malaysia in global supply chains, majority of studies that explore how global supply chain competitiveness could be achieved are drawn from developed countries' perspectives. While there is a growing argument that development of information technology has expedited effective supply chain management, empirical evidence still

remains inconclusive with numerous inconsistencies and contradictory findings on the potential benefits, indicating a possibility of mediator.

Drawing upon the resource-based view (RBV), dynamic capability theory (DCT), and social exchange theory (SCT), this study develops an integrative framework determining the impact of supply chain capabilities on global supply chain competitiveness. This research also investigates the mediating role of information sharing in the relationship between the different global supply chain capability factors and global supply chain competitiveness. In order to validate the theories, cross-sectional data were collected from Malaysian firms involved in the manufacturing industry; and analysed through structural equation modelling (SEM) to determine the relationships established.

The study demonstrates that local manufacturers perceive organisational-culture fit and logistics integration commitmentas a significant component that affect their global supply chain competitiveness. The role of information sharing as a mediator in this research also facilitate in explaining why many local firms engage in international businesses fail to gain global supply chain competitiveness despite of investing huge amount of resources in building information technology infrastructure, trusts and strategic relationships. As Malaysia is moving towards a knowledge-based economy, more advanced and innovative technology should be adopted to improve competitiveness. The quality of information exchanged could further be improved if they are also willing to share not only operational information, but also strategic information. This study offers theoretical contributions by demonstrating knowledge on the issues relating to global supply chain competitiveness from the perspectives of Malaysian home-grown companies and supports the proposal that information sharing

plays a mediating role between the different dimensions of theories proposed towards global supply chain competitiveness in the manufacturing industry.

ABSTRAK

Sepanjang dekad yang lalu, banyak rantaian bekalan global telah mengalami perubahan di mana negara-negara membangun termasuk negara-negara Asia telah menjadi pengeksport utama barangan ke Kesatuan Eropah dan Amerika Utara. Dalam konteks negara Malaysia, pembangunan dan pertumbuhan sektor pembuatan tempatan menyaksikan pembangunan yang begitu pesat semenjak akhir era 1990an dengan indutsri tersebut menjadi sektor utama penyumbang kepada hasil eksport negara. Dengan peningkatan ketidaktentuan rantaian bekalan global, permintaan eksport dari negara maju dijangka kurang memberangsangkan. Penetapan tahap kualiti yang lebih tinggi serta permintaan nilai tambah yang tinggi menggunakan teknologi intensif menyebabkan syarikat-syarikat tempatan kurang mampu untuk berdaya saing. Perjanjian Perkongsian Trans-Pasifik (TPPA) seterusnya dijangka mewujudkan lebih banyak persaingan dan cabaran bagi syarikat-syarikat tempatan Malaysia, selari dengan halangan perdagangan yang semakin berkurang. Kesediaan syarikat-syarikat tempatan untuk menghadapi cabaran TPPA adalah diragui memandangkan sektor-sektor pembuatan negara masih lagi mempunyai nilai tambah yang rendah. Oleh itu, syarikat pembuatan tempatan perlu berupaya untuk membangunkan amalan pengurusan yang berkesan untuk membantu mereka bersaing di peringkat global dan menjadi lebih kukuh serta tidak terjejas semasa krisis ekonomi.

Walaupun terdapat peningkatan penyertaan negara-negara membangun termasuk Malaysia di dalam rantaian bekalan global, majoriti kajian penyelidikan yang dijalankan berkaitan dengan isu ini hanya mengambilkira perspektif dari negara-negara maju.

Walaupun terdapat hujah yang mengatakan bahawa perkembangan teknologi maklumattelah membantu pengurusan rantaian bekalan dengan lebih berkesan masih terdapat bukti empirikal yang tidak meyakinkan dengan pelbagai penemuan yang bercanggah yang menunjukkan kemungkinan wujudnya mediator.

Melalui teori 'Resource Based View'(RBV), teori 'Dynamic Capability' (DCT) dan teori 'Social Exchange' (SCT), kajian ini membangunkan satu rangka kerja integratif yang menentukan faktor-faktor yang menyumbang kepada keboleh saing rantaian bekalan global dan perkongsian maklumat. Kajian ini juga menyiasat peranan perkongsian maklumat sebagai mediator. Dalam usaha untuk mengesahkan teori, data telah dikumpulkan daripada syarikat Malaysia yang terlibat dalam industri pembuatan; dan data tersebut dianalisis melalui teknik 'structural equation modelling (SEM)'.

Kajian menunjukkan syarikat pengeluar tempatan meletakkan budaya organisasi dan komitment terhadap integrasi logistik sebagai komponen penting yang mempengaruhi keupayaan rantaian bekalan global. Peranan perkongsian maklumat sebagai mediator dalam kajian ini juga membantu dalam menjelaskan mengapa banyak syarikat tempatan terlibat dalam perniagaan antarabangsa gagal meraih keupayaan rantaian bekalan global walaupun melabur sejumlah besar sumber-sumber dalam pembinaan infrastruktur teknologi maklumat dan hubungan strategik. Ketika Malaysia bergerak ke arah ekonomi berasaskan pengetahuan, teknologi yang lebih maju dan inovatif perlu diguna pakai untuk meningkatkan daya saing. Kualiti maklumat dikongsijuga mungkin boleh diperbaiki sekiranya mereka juga bersedia untuk berkongsi bukan sahaja maklumat operasi, tetapi juga maklumat strategik. Kajian ini menawarkan sumbangan teori dengan mendalami isu-isu yang berkaitan dengan keupayaan rantaian bekalan global dari perspektif syarikat tempatan Malaysia; dan menyokong bahawa perkongsian maklumat memainkan peranan sebagai mediator.

ACKNOWLEDGEMENTS

Firstly, I would like to express my sincere gratitude to my beloved and dedicated supervisor Dr. Suhana Mohezar Ali for her continuous support of my PhD study, for her patience, motivation, and immense knowledge. Her help and guidance helped me in all the time of research and writing of this thesis. I could not have imagined having a better supervisor and mentor for my PhD study.

I would like also to thank to the rest of faculty member in the Faculty of Business and Accountancy especially for dedicated Dean, Professor Dr. Che Ruhana Isa. And, thank you to the Deputy Dean of Postgraduate, Associate Professor Dr. Zakiah Saleh, and Associate Professor. Dr. Noorismawati Jaafar, the Head of Department of Operations and Management Information System and all lecturers for their insightful comments and encouragement. And also for the hard question which incented me to widen my research from various perspectives. It is also a pleasure to thank all faculty staffs for their indispensable help when dealing with research funds and administrative matters during my data collection in my study.

I would also like to express my appreciation to the Graduate School of Business (GSB) for providing a pleasant studying atmosphere and excellent facilities to support my studies. Many thanks go, in particular, to the Director of School and staffs for their continuous support and encouragement.

My greatest appreciation also goes to the Malaysian Ministry of Higher Education and University of Malaysia Sabah particularly to the Dean of Faculty of Business, Economics and Accounting for granting me an opportunity to engage in this valuable journey to complete my PhD study.

My sincere thanks also goes to my dearest parents Hj. Idris and Hjh Katijah , my family and my daughter Princess Nadia, Mr. Zainal Ariffin and family for supporting me spiritually throughout writing this thesis and my life in general. Thank you for enlightening my days through valuable love and emotional support.

And, I would like in particular to thank Associate Professor Dr. Abdul Razak Ibrahim for enlightening me the first glance of research in the earlier stage of my study. Last but not the least, thank you to my all friends and individuals involve directly or indirectly in helping me to complete my PhD study.

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LIST OF SYMBOLS AND ABBREVIATIONS

AFTA	Asean Free Trade Area
ANOVA	Analysis on Variance
AVE	Average Variance Extracted
APS	Advanced Planning and Scheduling Systems
CBSEM	Covariance-based SEM
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CPFR	Collaborative Planning Forecasting Replenishment
DOI	Diffusion of Innovation
EDI	Electronic Data Integration
EFA	Exploratory Factor Analysis
EM	Expectation Maximisation
ERP	Enterprise Resource Planning
FMM	Federation of Malaysian Manufacturers
GDP	Gross Domestic Product
IT	Information Technology
KMO	Kaiser-Meyer-Olkin
MAR	Missing at Random
MATRADE	Malaysian External Trade Division Corporation
MCAR	Missing Completely at Random
MES	Manufacturing Execution System
MIDA	Malaysian Industrial Development Authority
MITI	Ministry of International Trade and Industry
ML	Maximum Likelihood
MNEs	Multinational Enterprises
MNAR	Missing Not at Random
MNC	Multinational Corporation
MVCMB	Malaysia Venture Capital Management Berhad
OEM	Original Equipment Manufacturer
PAF	Principal Axis Factoring
PLS	Partial Least Square
R & D	Research and Development
RFID	Radio Frequency Identification
SME	Small Medium Enterprise
SPSS	Statistical Package for the Social Science
TCE	Transaction Cost Economics
TLI	Tucker Lewis Index
TMS	Transportation Management System
TOE	Technology-Organisation-Environment

UNIDO	United Nations Industrial Development Organization
VMI	Vendor Managed Inventory
WMS	Warehouse Management System
WTO	World Trade Organisation

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CHAPTER 1: INTRODUCTION

1.1 Research Background and Problems Statement

Intense globalisation has led to a more competitive economics and geographical environment in which the world is seen as one marketplace and not segmented by country. Since the 1970 and 1980s, the U.S manufacturing firms have been slicing up their supply chains in search of low-cost and capable suppliers offshore (Dicken, 2011). The chain has grew from regional production-sharing arrangement to full-fledged global supply chains encompassing not only finished goods, but include components and subassemblies; affecting activities such as call centres, accounting and research and development. Over the past decade, many global supply chains companies have experienced a shift in which large and emerging economies are playing prominent roles as exporters, with Asia represented as among the higher exporters of intermediate goods to European Union and North America in 2008 (OECD, 2011). Notwithstanding this, 52 percent of the Asia's manufacture exports were also destined for developing countries (WTO, 2011), indicating a shift of the end markets in the global economy. In Sub-Saharan Africa for example, the entry of South African clothing manufacturing lines into neighbouring countries has led to the rise of global supply chains.

While engaging with international partners could offer immense opportunities, the practice often creates conflicts. Global supply chains (GSCs) are more complicated than domestic supply chains owing to the various issues facing by businesses including tariffs, currency exchange, tax zones, economics group, and social cultural (Manuj &

Mentzer 2008; Sajadieh 2009). There are series of product recalls in recent years that have shaken the public confidence in the ability of manufacturers to assure the safety of product exported to developed markets. This involves suppliers originated from developing countries, since they possess lower quality standards and safety regulations than their developed countries counterparts (Marucheck, Greis, Mena & Lai, 2011; Speier, Whipple, Closs & Voss, 2011). In the pharmaceutical industry for instance, the global sourcing of both inactive and active medical substance from emerging economies has increased the risks of product contamination, as in the case of heparin incident in 2008 (Blum, 2008). With the long supply network involving many entities in different countries, operating in a global environment, thus may poss challenges to the local firms.

Within the context of Malaysia, the globalisation and economic transformation have provided both opportunities and challenges for the local industry. The increased trade liberalisation offers opportunities for local manufacturers to tap into new markets and easy access to advanced technology, human resource and capitals. Yet, the integration of Malaysia into international markets entails the local firms to comply with stricter quality regulations and produce technology-intensive goods, which may impede their participation. The emerging trend of the Trans-Pacific Partnership Agreement further is expected to create more competition and challenges for the domestic market as a result of the removal of impediments to trade, which would encourage greater imports. In response to such challenges, the local manufacturing firms need to be able to develop effective management practices and gradually building up their capabilities to help them in competing globally and to be more secure in times of economic crisis.

Increased competition and consumer expectations for product value, variety as well as convergence of taste in disparate geographical regions have forced organisations to adopt a new competitive strategy for sustainability (Tencati, Russo & Quaglia, 2010; Gereffi & Lee, 2012). GSCs therefore must be carefully selected and monitored to ensure competitive edge that is required to achieve success in the global marketplace is attained. Matching the procurement, production, transportation, marketing and services activities with the right country conditions would lead to reduced cost, improved quality and innovations. This issue also highlights the need of fundamental change in the way the companies from developing economy, including Malaysia should manage their manufacturing operations, so that they could continue competing at the highest levels. They need to become more responsive to support more flexible and leaner manufacturing environment.

Despite the growing importance of developing countries' participation in global supply chains, majority of studies that explore how global supply chain competitiveness could be achieved are drawn from developed countries' perspectives (Motwani, Madan & Gunasekaran, 2000; Narasimhan & Mahapatra 2004; Panayides, 2006; Locke & Romis, 2012). Although these studies do provide insights, the theories, concepts and practiced developed in the context of mature markets are argued to be not applicable for emerging economies (Golgeci & Arslan, 2014). Firms within this nation have distinctive characteristics and behavioural patterns that have been ignored in international business research (Demirbag, Apaydin & Tatoglu, 2011). With quite idiosyncratic socio-political and socioeconomic, their institutions are constantly changing, making them more relevant in this area of research. This argument creates an imperative need to investigate this issue from the view of emerging market.

There is growing argument that rapid development of information and communication technology (ICT) has expedited effective SCM. The technology offers support in managing SC globally by facilitating the flow of materials and transactions with a more efficient way of communicating and sharing information. The revolution of this state-of-the-art tool has also increased the rate of innovation. Yet, the success of a firm's supply chain technology implementation depends greatly on the accuracy and speed of the information provided by each partner in the network (Chong, Ooi & Sohal, 2009). Wal-Mart is an example of company that rely on information sharing practice to manage its supply chain. The retailer shares online summaries of point-of-sales data with its close suppliers such as Johnson & Johnson and Lever Brothers (Lee, So & Tang, 2000), reaping reduced inventory and manufacturing costs and better understanding of customers' needs. Information sharing between business units in a supply chain is essential as it provides supplier linkage, internal linkage and customer linkage leading to better performance (Du, 2007; Sezen, 2008).

While the concept of information sharing in a global supply chain environment is not new, yet implementing such strategy remains scant in many firms originating from emerging economies. Within the information sharing literature, little empirical evidence exists on this issue. Despite the espoused benefits of information sharing in managing global supply chains, recent literature indicates that such practice has been low and in some cases firms have even abandoned such practice (Mohezar & Nazri, 2014; Ramayah & Omar, 2010; Ye & Wang, 2013). These findings have sparked in how industrial managers can successfully and effectively get their firms engage in information sharing to enhance their global supply chain competitiveness. While many of the local manufacturing companies in developing nations have started to emerge and

globalise their operations in diverse industries such as electronics, automotive and consumer durables, they are commonly at disadvantage as compared with multinational corporations from developed countries (Jean, Sinkovics & Kim, 2010; Cuervo-Cazurra & Genc, 2012). They tend to rely on low-cost strategy. Yet, a low cost strategy is not sustainable and instead they should place more emphasis on being more innovative, in which the role of information sharing may come into play. As information sharing is closely related to the success of supply chain (Thun, 2010; Kogoclu et al., 2012), it is imperative to further identify the fundamentals that contribute to such practice, how it could help the local firms in gaining the global supply chain competitiveness. With much manufacturing outsourced from emerging economies, addressing this issue from the perspective of emerging economies is in need. Moreover, with various new information technologies impacting manufacturing sector are rapidly being introduced in the market, further research on information sharing exploring wider range of technologies may facilitate in building deeper understanding of this issue.

Despite the numerous studies on information technology and supply chain performance in the past, majority of them conceptualised information technology capabilities construct as technology alignment, inter-organisational technology integration and e-integration (Rajaguru & Matanda, 2013; Wu, Yeniyurt, Kim & Cavusgil, 2006; Morgan, Richey & Autry, 2016), which are mainly based on the technical aspects. Rajaguru and Matanda (2013) for instance, have conducted a study involving Autralian retail operators. Their studies have measured the information technology capabalities in terms of technology compatibility and integration between firms and supply chain partners. In another study conducted by Wu et al. (2006), information technology capabilities are conceptualised as the degree of IT advancement

and alignment between firms and partners as compared to the competitors. These constructs were developed based on the resource based view theory. Similarly, based on the resource based view theory, Morgan et al. (2016) has explored the influence of information technology competency on logistics capabalities. The study has measured the information technology competency using items that assess the capabilities of the IT systems in collecting and storing information.

While these studies do provide some valuable insights, they are limited in scope. Measuring the impact of technological resources on supply chain competitiveness by quantifying the technological aspects only may not provide a deeper understanding of this issue. Despite the importance of technological aspects, it is the frequency, quantity and quality of information that is shared that really pertinent. Over reliance on technology without willingness to share the critical information regarding the supply chain operations may not contribute to the maximum benefits. In exception to Projogo and Olhager (2012) and Ramayah and Omar (2010), little research has examined this issue.

Prior supply chain research have adopted inter-disciplinary theories such as diffusion of innovation (DOI), resource-based view and the technology acceptance model to explain information technology integration efforts within a supply chain environment. Nevertheless, a void persists in theories explaining this issue. For instance, while theory such as DOI has been applied widely in the technology adoption field, many researchers have questioned the usefulness and applicability of this theory to elucidate the acceptance of complex and networked technologies utilised in the supply chain environment (Lyytinen & Damsgaard 2011; Prescott & Conger 1995).

They argue that the adoption of these types of technologies not only requires firms to interface their internal IT infrastructure with their supply chain partners', but also require them to change their organisational processes and structures, and engage in intensive learning. Other researchers have also argue that resource-based view may not be able to fully explain why some firms that have substantial resources fail to refresh and change then in turbulent environment (Ambrosini & Bowman, 2009; Rajaguru & Matanda, 2013). Given these arguments, it is appropriate to consider grounding this issue on other theories or combining several theoretical perspectives to fill this void. Within the global supply chain literature, there are lacks of studiesthat combine several theoretical perspectives into an integrated view of global supply chain competitiveness (Izam Ibrahim, Costello & Wilkinson, 2013). Focusing only on one theory may lead to an overestimation of the impact of some factors (Chwelos, Benbasat & Dexter, 2001; Hair et al., 1998). Similarly, having a unified research framework may contribute to improved theory development with greater explanatory power (Kuhn, 1970).

The present study extends existing research in global supply chains context in the following ways. First, this study contributes to the emergent interest in this field by focusing on how the developing economies, particularly local Malaysian manufacturing firms could enhance their global supply chain competitiveness. Malaysia is one of the affluent economies in Asia with a rapidly growing manufacturing industry. The country's manufacturing sector is estimated to grow at 4.8 per cent per annum, supported by the recovery in exports, particularly of electrical and electronics products (Malaysian Government, 2015). Unlike prior research which looks into the success factors of multinational corporations such as Motorola and Nike (Bhatnagar & Vismanathan, 2000; Kouvelis & Niederhoof, 2007; Doorey, 2011), this research

concentrates on the local home-grown manufacturing companies that compete in the international market. The analysis of critical factors affecting the local firms' global supply chain competitiveness is important given the growing importance of Malaysia in the formation of internationally dispersed production and trade networks.

Second, this study expands prior works by investigating the role of information sharing in global supply chains. Unlike previous studies which are mainly focusing on linking technology to supply chain performance (Lee et al., 2000; Croson & Donohue, 2003; Zhou & Benton, 2007; Rajaguru & Matanda, 2013), this study examine technology capability from both aspect technical (information technology advancement) and the social aspects (information sharing). Furthering this thought, this study posits information sharing to be the mediator between different dimensions found to affect global supply chain competitiveness. Within the international business literature, factors such as strategic alliances (Bhatnagar & Vismanathan, 2000; Kumar & Malegeant, 2006), technological advancement (Wu et al., 2006), trust (Handfield & Bechtel, 2002), logistics integration (Song & Panayides, 2008; Projogo & Olhager, 2012), and strategic sourcing (Khan & Pillania, 2008) have been cited as important in achieving supply chain competitiveness. Yet, there were divergent empirical results reported on the direct effects of these dimensions on firm performance in the existing literature highlighting the existent of a mediator. While information sharing has not been explicitly theorised as mediator in the past literature, information sharing has been implicitly serve as an important link between these dimensions and performance. Information sharing has been widely recognised not only as one of the key benefits, yet also a significant antecedent of firm performance. This study specifically proposes there an important mediator – information sharing; and that the existence of the mediator offers an

alternative explanation for the divergent and sometimes conflicting empirical results obtained from prior research.

In examining the global supply chain competitiveness and information sharing issues among the Malaysian manufacturing firms, this study develops a conceptual model based on several theoretical perspectives which include resource-based view, dynamic capability theory, and social exchange theory.

1.2 Background of Malaysia

Situated in the Asia-Pacific region, Malaysia is bordered by Singapore and Indonesia in the south, Thailand in the north, and the Philippines in the east. As of 2010, Malaysia's population was 28.6 million, dominated by Malays (50.1 per cent) (Malaysian Statistics Department, 2012). Similarly, over 60 per cent of Malaysians are in the middle to high income group, with a growing purchasing power. Malaysia registered a strong economic growth with a Gross Domestic Product (GDP) estimated at USD 65.7 billion in 2014 (Malaysian Statistics Department, 2014). Malaysia's impressive economic performance is largely due to heavy inflows of foreign direct investment (FDI) since the introduction of the Investment Incentives Act 1968 and the Second Malaysian Plan (1971-1975), which have successfully transformed the country from a producer of agricultural commodities into an emerging multi-sector economy (Athukorala & Menon, 1995). In 2011, Malaysia emerged as the third largest recipients of FDI flows among ASEAN countries, after Singapore and Indonesia (Malaysian Investment Development Authority, 2012).

Despite the importance of FDI for continued development of the country's economy, the role of domestic investments is not to be underestimated. In the National Economic Model (NEM), Economic Transformation Programme (ETP) and the 10th Malaysian Plan, the government has positioned the local manufacturing and services sector as an engine of domestic investment that will drive the national economic growth, with a strong emphasis in high-value added and innovation. Under these plans, the sector will be revitalized through supply chain management strategy, wider acquisition of technology and intense innovation activities by Malaysian-owned companies.

In the year 2013, the manufacturing sector's contribution to the country's GDP amounted to USD 48.2 billion from USD 27.5 billion in 2005, an increase of 75 per cent. In the year 2013, Malaysia has recorded total exports amounted to USD258 billion. This figure increased by 9.6 percent from the previous year 2012 (Malaysian Statistics Department, 2013). Among the top ten export destinations which registered significant growth were Singapore, China, Japan, the United States India, Indonesia, Thailand, Hong Kong, South Korea, India, and Australia. Table 1.1 shows top ten Malaysian export destinations. The development and growth of Malaysian manufacturing sector was so rapid since the late 1990s; and this industry remains the largest component of total exports today. While electronic and electrical (E & E) products continue to account for a significant proportion of Malaysia's total exports (42.4 per cent in 2010), the share of non E & E manufactured products are increasing sharply from 23.4 per cent to 33.8 per cent during the same period. Although the share of Malaysia's exports to traditional markets such as the US, Japan and European Union (EU) remains steadily, demands from emerging economies have also risen substantially from 40.2 per cent to 69.3 per cent (Malaysian Statistics Department, 2011). The

country's wealth of natural resources and greater focus on higher value-added downstream manufacturing activities have facilitated Malaysia in satisfying global demands for raw materials, changing the structure of Malaysia's products exports.

Table 1.1: Top ten export destinations 2013
(http://atlas.media.mit.edu/en/profile/country/mys/#Destinations)

Country	Export value (USD billion)
Singapore	37.0
Province Republican of China	33.4
United State of America	23.7
Japan	27.8
Indonesia	12.7
Thailand	12.4
Hong Kong SAR	10.4
Republic of Korea	9.85
India	8.82
Australia	8.59

Despite the notable progress of export performance and immense opportunities in the manufacturing sector, two key challenges remain in the continuing efforts to ensure sustained export performance going forward. First, with increased uncertainty on the global outlook, export demand from the advanced economies is expected to be less buoyant. While globalisation creates opportunities for increased manufacturing product exports, the integration of Malaysia into international markets not only entails the local firms to comply with stricter quality regulations and produce technology-intensive goods, yet they need to be able to achieve sustainable manufacturing practice by incorporating social and environmental dimensions, which may impede their participation (Zubir et al., 2012). The U.S and European citizens' support of their governments' move in coordinating and regulating the economic, environmental and social dimensions of sustainability (Gunasekaran & Spalanzani, 2011; Seidel, Sahbazpour & Seidel, 2007) for instance, creates an urgent need for local companies to

satisfy the demand. The emerging of the Trans-Pacific Partnership Agreement for example is expected to create more competition, issues and challenges for the Malaysian local companies, as a result of the removal of impediments to trade, which would encourage greater imports. Both critics and supporters of the TPP agreement contest the Malaysia's readiness to take advantage of its export, as many of the key-sectors are low on value addition. Due to this reason, the local manufacturing firms need to be able to develop effective management practices to help them in competing globally and to be more secure in times of economic crisis. The increased uncertainty on the global growth outlook, particularly in the industries that are more dependent on the advanced economies, such as Electronic and Electric (E&E) sector may lead to challenges in the competitiveness of Malaysian export sector.

Second, the rise of several large emerging economies, particularly Asia will intensify competition in global markets for manufacturers, especially in the export of low-cost, labour-intensive products. China and its "unlimited supply of labor," rapid productivity growth, and highly interventionist state for instance have posed some threat to the Malaysian economy, since China competes with Malaysia in approximately 70 per cent of the country's products exports (Mahnot, 2007). Given these, it is quite plausible that China will enjoy comparative advantage in a wider range of manufacturing products and enhance the country's position in the global economy.

These trends are expected to challenge the competitiveness of the Malaysian manufacturing export sector. Many organisations outside the developed world, particularly newly industrialised countries in the South East Asian region has increasingly realised the importance of supply chain management (SCM) practices

(Gereffi & Lee, 2012) in ensuring their long-term survival and competitiveness. Yet, within the Malaysian context, Rahman (2012) has found that there are many problems and challenges that arise in relation to the implementation of SCM. Insufficient understanding of SCM as well as technology matters and data sharing are among the possible factors behind the failures of SCM implementation. Hence, there is an imperative need for firms to capitalize on the strengths and advantages of Malaysia and stay ahead by developing the industry's global supply chains, which would enable them to enter into international markets. Environmental issues for instance could not be managed in isolation with supply chain activities (Haldorsson, Kotzab & Skjott-Larksen, 2009; Vachhon & Klassen, 2006). In fact, this sustainable management practice need to be incorporated into various supply chain activities including purchasing, product design and logistics, requiring varying degrees of interaction among upstream and downstream partners, which could be rationalised through real-time information sharing. It is imperative therefore to comprehend how managers in local manufacturing firms could benefit from the potential and possibilities of information sharing in streamlining their global chain operations, and gain competitive advantage for business sustainability. At the national level, there appears to be a compelling need for governments to develop comprehensive supply chain strategies and effective institutional policies to maintain the global competitiveness of the local manufacturing industry. This study therefore appears to provide platforms in determining how supply chain capabilities could facilitate the local manufacturing firms in enhancing their global supply chain competitiveness; and in evaluating the role of information sharing in managing the global supply chain competitiveness among Malaysian home-grown companies.

1.3 Research Objectives and Research Questions

This study aims to understand the global supply chain capability factors that would influence global supply chain competitiveness of the Malaysian manufacturing firms; and the mediating role of information sharing in the relationships between the different supply chain capability factors and global supply chain competitiveness. Specifically, this study objective is:

RO1: To examine the supply chain capability factors that would influence global supply chain competitiveness of the Malaysian local manufacturing firms.

RO2: To examine the supply chain capability factors that would influence information sharing among the Malaysian local manufacturing firms.

RO3: To study the role of information sharing as a mediator between the supply chain capability factors and global supply chain competitiveness of the Malaysian local manufacturing firms.

Based on these aims, an underlying research question is established as follows:

"How could the local firms in the manufacturing industry enhance their global supply chain competitiveness through supply chain capabilities?"

The main research question can further be divided into several sub research questions, as follow:

RQ1: What are the supply chain capability factors that would influence the global supply chain competitiveness of the Malaysian manufacturing firms?

RQ2: What are the supply chain capability factors that would influence the local manufacturing firms to engage in information sharing practice?

RQ3: How information sharing mediates the relationship between the supply chain capability factors and global supply chain competitiveness?

1.4 Research Significance

The findings of this research seek to contribute to the global supply chain management field. This study offers additional understanding of how the local manufacturing firms from emerging markets can sustain their global competitiveness. Global supply chains have been a familiar part of the international business landscape for decades. From the management perspective, there are always concerns associated with the efficient and timely distribution of products and materials flow across supply chains. In markets with rapidly shrinking product lifecycle, companies need to be able to continuously innovate by finding new methods of delivering high quality products and services. This is pertinent with growing numbers of firms in emerging nations that are challenging Western firms and entering international markets. Yet, with varying quality and quantity of supplies produced by local manufacturers alongside with low product innovations, there is a danger that they will be excluded from the global markets. Their ability to maintain and expand their market shares lies on their capacity to satisfy the diversifying consumers' demands. The challenge is, therefore, to bridge the gaps between local manufacturing firms and big multinational corporations by upgrading their capacity through various supply chain management practice. This study brings together relevant literature streams from supply chain management, international businesses and examines how the manufacturing industry of developing countries could enhance their global supply chain competitiveness. It is now increasingly recognised that "one size

does not fit all" when it comes to designing supply chain strategies to support wide range of goods with different markets having distinct characteristics.

This study will also attempt to contribute to a better understanding of global supply chain competitiveness and information sharing by integrating several theoretical perspectives. Since this study involves local manufacturing firms competing in global market, they are not only depending on their internal resources strength, but rely greatly on their dynamic capability as well as culture fit and inter-organisational relationship (Teece, 2014; Rai, Patnakayuni & Seth, 2006), illustrating further development of a more comprehensive conceptual framework. This study therefore is expected to bridge the knowledge by developing a new theoretical conceptual model underpinning by resource-based view, dynamic capability theory, and social exchange theory to explain the information sharing and global supply chain competitiveness. This study also perform adaptation towards developed instruments for measuring driven factors in supply chain; information sharing; and global supply chain management. Originally these instruments were used to examine the variables in developed countries in which the operating environment is different from developing economies. The study will also ascertain the mediating role of information sharing in value-enhancing of strategic partnerships, organisational management and culture as well as supply chain dynamism with global supply chain competitiveness. This finding could further enable researchers, academicians and practitioners make valuable improvements on the existing systems.

From a practical perspective, the results of this study could assist firms in formulating strategies and capitalising on the benefits of information sharing with supply chain partners, which may provide platforms and opportunities for more

effective managerial decision making. This is vital, as the potential benefits of information sharing relies on a range of factors. This study also informs the government's business support service strategy on the economic and commercial viability of developing countries' manufacturing industry, particularly Malaysia. The success of Malaysia, as a developing economy depends much on the effectiveness of the institutional policy. Aggressive interventions by the government through various incentives and control mechanisms are necessary to develop the manufacturing industry. From a national perspective, countries are concerned about whether they can gain and maintain the production, sales and research capabilities that are needed to make low cost, high quality and innovative products; and the ability of countries to prosper in the global economy depend greatly on their role in global supply chains.

1.5 Delimitations of scope and key assumptions.

There are some delimitations of this research. First, while a supply chain could consist of multiple-tiers of networks, this study only focus on the information sharing between a manufacturer and its first-tier supply chain partners. While the use of dyads and triads are more valuable approaches in studying supply chain issues, such methodology is difficult to employ as the number of partners increases. Most models of the supply chain matters therefore, examine a portion of supply chain (Supply Chain Council, 2009).

Second, this study concentrates only on "home- grown" manufacturing firms that buy resources, create and sell goods or services in a variety of countries. This research does not include big multinational firms such as Texas Instruments, Nestle, and Coca-Cola. Third, despite the importance of both financial and non-financial accounting

measures in quantifying the global supply chain competitiveness, this study only uses non-financial dimensions which are captured through managerial perceptions. With limited availability of financial data, it is impossible to quantify the supply chain capabilities using accounting measures. Finally, this study does not attempt to generalize the findings to the Malaysian manufacturing industry, but rather intends to supplement the body of knowledge by providing quantitative evidence on this issue through validating constructs developed using structural equation modeling.

1.6 Organisation of the Thesis

This research is organised into seven chapters. Chapter one presents the introduction to this thesis, exploring the background and scope of the research conducted, as well as the significance of the research to the academia and practitioners. This chapter also highlights the aims of the research and provides the outline of each chapter in this study.

Chapter Two presents an overview of the Malaysian manufacturers, the industry outlook and the government support in assisting the industry.

Chapter Three discusses the prior literature on global supply chain management, which facilitate in building the theoretical foundation. It illustrates the problems that are associated with global supply chains, and how information sharing could help manufacturers in coordinating varying processes and activities in global supply chains. This chapter further explains several relevant theories that may help in ascertain the supply chain capability factors influencing information sharing and global supply chain

competitiveness. The chapter concludes with a discussion on the knowledge gaps based on the reviewed literature.

Chapter Four discusses the theoretical framework that formed the research model in this study based on the reviewed literature. Chapter Five discusses the research methodology for the study. The chapter highlights the research setting, data collection procedures and proposed techniques of data analysis. Following this chapter 6 describes the initial data preparation, sample demographics of responding firms, measurement model assessment, structural model and hypotheses testing. In addition, the chapter also discusses the main findings of this study. This research concludes with a managerial and policy discussion on managing the information sharing in a global supply chain through various strategies. These are discussed in Chapter 7.

CHAPTER 2: INDUSTRY BACKGROUND

2.1 Introduction

There has been growing interests of how supply chain management and information technology could facilitate firms in emerging countries to enter international markets and improve their global competitiveness. Despite the existence of empirical evidence, many firms from these nations are still struggling, with comparatively low quantity and quality of exports products, suggesting that the inherent potentials have not yet manifested itself into desirable levels of development. Being an emerging country, Malaysia's manufacturing industry might possess similar attributes with other developing countries, which make this nation an appropriate sample for this empirical work. This chapter highlights the characteristics of Malaysia's manufacturing industry, the challenges and problems faced by the local firms and the level of global supply chain practice exercised.

2.2 The Malaysian Manufacturing Industry

The Malaysian economy has made an enormous leap since its independence in 1957. The country which depends on agriculture and primary commodities in the 1960's has been transformed to multi sector economy (e.g. electrical and electronics, automobile and steel) spurred by advanced technology, knowledge-based and capital intensive. The manufacturing sector contributes 24.5 per cent to the country's GDP in the year 2013

(Ministry of Finance, 2013) and continues to be an important engine of the economic growth for the country. In the year 2015, Malaysia has recorded total exports of manufactured products amounted to USD179.7 billion (MIDA, 2015) accounted for 67 per cent of the country's total exports. Under the Malaysian Industrial Development Authority (MIDA), there are number of manufacturing industries which are classified as electrical and electronics (E & E), chemical and chemical products, metal, optical and scientific equipment, machinery, appliances and parts, automobile, textile.

Generally, Malaysia's manufacturing sector contributes almost 67 per cent (MIDA, 2015) as compared to other sectors in country's exports. The Malaysian government need to work hard in an effort to maintain, preserve and enhance the industry. The integration of local companies into the global arena entails them to comply with stringent regulations in a particular country. The Malaysian food manufacturers that export their goods to Australia for instance, are abiding by the global standards such as CODEX and Australian Food Standards Code.

While Malaysia is endowed with rich natural resources and is known as exporters of palm oil, rubber, timber and rice, the incomes that are generated from this sector is not enormous as compared to the manufacturing industry. In 2015, manufacturing sector contributed 23 per cent to the country’s GDP, while the agro-based industry only contributed 8.8 per cent (Malaysian of International Trade & Industry, 2016). With a strong manufacturing industry, Malaysia does not need to rely on the agro-based industry solely. Moreover, the manufacturing sector not only act as an engine of growth but it could facilitate in boosting the development of agro-based industry by providing value added activities for downstream processes such as product

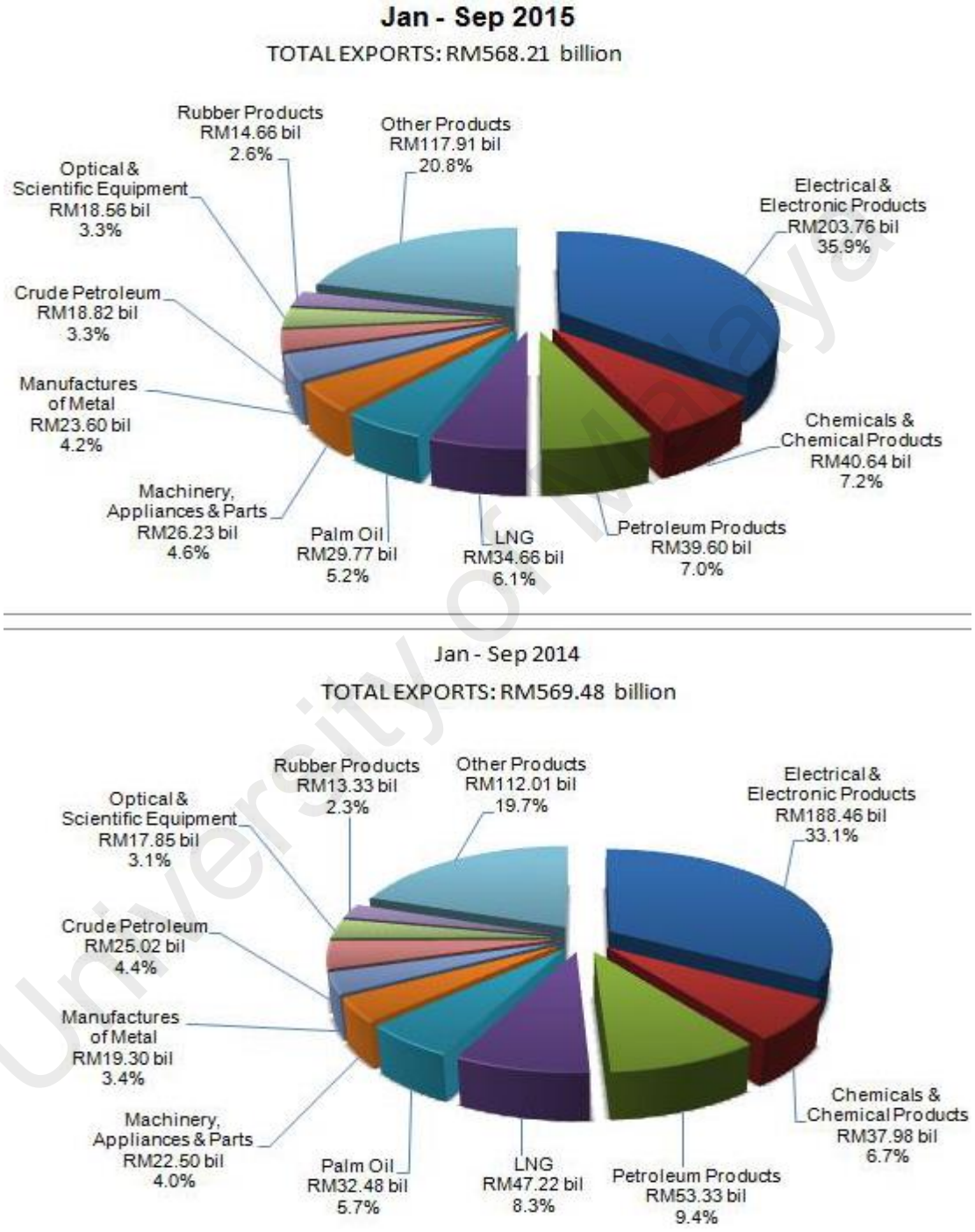
processing, packaging and distributing. The manufacturing sector further could assist in research and development for production purposes. In 2013, the country has attained as one of the most sophisticated export structure among developing countries, well above the level predicted based on it income (UNIDO, 2013). Malaysia was ranked third in the world league table of high-tech exporters, with 40 per cent of the country's manufactured exports are classified as high-tech products (World Bank, 2013) (Table 2.1).

Table 2.1: Share of High-tech Manufactured Exports (World Bank, 2013)

Country by ranked	Share of hi-tech manufactured export products (%)	Per capita income (USD)
Philippines	66	1,790
Singapore	51	37,220
Malaysia	40	7,230
Korea	33	19,830
China	29	3,590
U.S	27	47,240
Ireland	26	44,310
Thailand	25	3,760
Hungary	24	12,980
Switzerland	23	56,370
Netherlands	22	49,350
Finland	21	45,680
France	20	42,680
Mexico	19	8,920
U.K	19	41,520
Japan	18	37,870
Sweden	16	48,930
Denmark	16	58,930
Israel	16	25,740
Canada	15	41,170

The transformation of the country’s economy from agricultural based to a dynamic and vibrant industrialising nation is attributed to a variety of pull factors. Stable political and economic environment, ambience business policies, competent workforce and supportive infrastructure have made this country an attractive place for foreign direct investment (FDI). Malaysia was ranked as among the world's top 16

attractive countries for FDI (United Nations Conference on Trade and Development, 2014).



Note: 1RM is equivalent to USD 0.22

Figure 2.1: Malaysia Total Export 2014 and 2015 (www.Matrade.gov.my, 2015)

Within the South East Asia, Malaysia emerged as the third favorable location for FDI, after Vietnam and Thailand. Foreign direct investment becomes the main contributor for Malaysia's manufacturing sector development, with multinational corporations (MNCs) from 60 countries has invested in over 3,000 firms in the country (MIDA, 2009). The investments of foreign firms in local manufacturing firms could facilitate the transfer of new technology to the Malaysian economy leading to higher employment.The Malaysian manufacturing industry generated a significant number of employment opportunities. The industry contributed 24.4 per cent of total employment (1998.9 thousand) in 2012 (Malaysian Statistics Department, 2014).

Foreign Direct Investment (FDI) influences structural change and encouraging the development of clusters and exploitation of cluster economies (WTO, 2014). It promotes diversification into new sectors, particularly in attracting new high-tech sectors, and through spillover effects, which make local firms more competitive. This will also attract local firms to engage in new businesses. Similarly, joint-ventures and contributions made with developed nations generated within the manufacturing industry may yield a lot of other benefits which could facilitate in positioning Malaysia to a higher level and respected globally. The industry is expected to play a significant role in driving the Malaysian economy not only from an agriculture-based to an industry-based, yet to a fully developed country by 2020.

Although Malaysia shows an impressive achievement and continues to be among the prime location for FDI for foreign countries, the country has yet to attain desirable achievement in the industry. Apart from the potentials generated by the country's manufacturing industry in developing the Malaysian economy, yet the sector

still faces considerable challenges, which may prevent further industry development. These challenges are discussed in the following section.

2.3 Challenges and issues faced by local manufacturing companies

Differs from its more successful neighbours such as Singapore, South Korea and Taiwan, Malaysia remains as an upper-middle income economy, with per capita income approximately 7,000 (Sharma, 2012). As compared with Korea, both countries were greatly relied on natural resources in 1960s with Malaysia appeared to record higher per capita income (2.6 times). Nevertheless, this position has been reversed. In 2009, Korea possessed higher per capita income (2.7 times) than Malaysia, owing to the rapid technological advancement in the key manufacturing industries such as electronics, shipbuilding, automobile and steel (World Bank, 2013). Despite that Malaysia has achieved global competitiveness in some sector; Malaysia relies heavily on foreign companies for core technologies and production organization, leading to inability of local firms in positioning themselves as parts of the value chain (Rasiah, 2010). While FDI could facilitate technology transfer to the local manufacturing firms, the success of such strategy depends on the absorptive capacity of these home-grown firms. Technology is much easier to be absorbed if the technology gap is narrower. Despite the fact that manufacturing sector is driven by knowledge and technology, local manufacturers are found to have lower degree of research and innovations, which may hinder further industry growth. A certain extent of research and technology development capability is required in any manufacturing firms. Process improvements and plant modifications are among continuous processes that need to be performed.

Furthermore, the manufacturing sector is currently in need of advanced engineering and technology skills. Majority of people in the manufacturing sector are not able to utilise ICT in the manufacturing processes (Ramayah & Omar, 2010). They are still working in the conventional manufacturing process environment. The availability of external and technical support will help in choosing appropriate mix of technology to be used in manufacturing facilities. Establishments of new operations by multinational corporations will further generate local sourcing of materials and services as well as local vendor development. These issues become significant in the Malaysian environment, since this sector is dominated by small and medium enterprises; 95.4 per cent (SMECorp Malaysia, 2011), which are notably lack of resources. Insufficient internal sourcing funds and ineffective delivery of funds through government agencies limits their potentials. While the adoption of robust quality techniques, practices and processes such as good manufacturing practice (GMP), lean manufacturing, online statistical process control and six sigma are important, these methods are relatively rare adopted by the Malaysian manufacturing firms (Ab. Rahman, 2012; Talib, Rahman & Qureshi, 2011).

The Malaysian Manufacturing firms may not be insulated from the impact of global economic crisis. They may be faced with unexpected temporary financial difficulties during recessions (Ismail et al., 2007). During this time, prices of materials, labour, energy and amenities could escalate, leading to higher production costs. Furthermore, manufacturers may need to reduce their production capacity as the demand for exports may decrease. A manufacturing company operating internationally has to be able to maintain its competitiveness in the face of price volatility.

The relaxation of trade barriers and globalisation such as the ASEAN Free Trade Area (AFTA) and World Trade Organisation (WTO) further are having a profound impact on the local manufacturing industry. The increased presences of larger business entities are threatening small and medium manufacturing firms, not only in the domestic market, yet at the global scale as well. In the case of cosmetic industry for instance, the market is dominated by giant cosmetic producers, which have managed to maintain their market positions by introducing innovative products through technology breakthroughs (Swidi et al., 2010). Moreover, the entry of China into the World Trade Organisation (WTO) has posed threat to the Malaysian economy since China competes with Malaysia in approximately 70 per cent of the country's product exports (Mahnot, 2007). Given that China has a large supply of cheap labour; it is quite possible that the country is able to attract large amounts of FDI, some of which could have come to Malaysia. As the Malaysian economy is heavily dependent on FDI, failure to attract foreign firms in investing in local manufacturing companies may present great challenges to its growth and prosperity. These challenges have prompted this study to focus on the global competitiveness of local manufacturing firms.

The local manufacturing firms are also confronted with lack of logistics efficiency (Raja Musa, 2009). Raw materials and other inputs need to be transported along the supply chain network, tendering manufacturing firms to either provide the service themselves or outsource. Currently, outsourcing of logistics activities is a trend present in Malaysia (Zayzan, 2011). While logistics now has been viewed as a strategic industry on its own, rather than supportive industry, there is still limited used of information technology to facilitate the transportation process. The logistics sector is currently lacks of ICT utilisations, hindering them to provide more value added and

cutting-edge logistics services to the manufacturers. A lengthy process of physical examinations of products that need to go through prior to enter a particular country, with more than one systems of approving and inspection authorities take place also causes delay in product delivery and manufacturing processes. The availability of linkage of transportation networks (e.g. air, sea, rail and road) to move products is a vital importance for smooth operations. Vicinity to raw materials, product markets and ports would definitely be an added advantage to manufacturing firms. Poor transport infrastructure will result in high transportation costs, large inventories and uncertain delivery time. As compared to Malaysia, Singapore and Hong Kong economic performance depends greatly on logistics capabilities (Carruthers, 2003; Arvis, Mustra, Panzen, Ojala & Naula, 2007). For instance, using their regional logistics capacity, they provide added value to products imported from China in order to meet the stringent quality requirements in developed nations.

Changing consumers' demands emerged from globalisations have resulted in an increased of product varieties. Products that were once the state of the art could easily be obsolete in a short span of time. Alternative products which could meet the customers' needs and requirements more satisfactorily or at lower costs become a threat to manufacturing companies. Changes of lifestyle for instance has resulted in an increased of demands for production of convenience food which need shorter preparation time and longer shelf life (Mohezar & Nazri, 2014). These changing consumer behaviours highlight the need for intense continuous innovations in the sector. Slow production process may allow competitors to have ample time in designing, developing and providing alternative products efficiently. Moreover, as consumers come from various cultures and academic background, there are various possibilities of

product usage. Some of the product may become unsafe or dangerous if they are not handled accordingly. Hence, manufacturers need to be able to foreseen this circumstance and incorporate certain measures in designing the products. This challenge becomes more acute for manufacturers that are competing in the global market.

In addition, other challenges such as weak relationships management, technological inadequacies, discomforts in sharing information, and lack of top management support are a few major challenge and issues in supply chain management and in manufacturing industry in Malaysia (Moberg & Speh, 2003). And also, owing to some unavoidable factors, some manufacturing facilities are isolated and secluded, with common interruptions in the basic supply of utilities such as internet connection, electricity and water, leading to operating downtime.

2.4 Conclusion

The Malaysian manufacturing industry has been a dominant source contributing to the country's exports, employment opportunities and technology transfer for local companies. While this sector appears to be an important driver for potential economic growth, the local firms are constantly facing various challenges. Despite the opportunities provided with the reduced trade barriers, the domestic manufacturing firms may face dangers of being excluded from the global supply chain owing to their limited capabilities in complying with greater quality standards, offering competitive prices, absorbing new technology and producing innovative products.

With restricted technology-skilled labour resources and supply chain management practice such as quality management, Just-In-Time (JIT) strategy and integrated information technology adopted, local manufacturing firms may not be able to compete in global markets. While it is important for the key manufacturing industries such as electronics, ship building, and automobile and steel to possess technology capability, the Malaysian local manufacturers are reported to have lower degree of technology competence, which may hinder future growth (mpc.gov.my, 2016). Majority of local firms in the Malaysian setting are not able to utilise ICT in their manufacturing process, hindering them to provide more added value and cutting-edge products. With 95.4 per cent (SMECorp Malaysia, 2011) of the sector encompasses of small and medium enterprises, this issue would become significant, as they are notably lack of resources to implement and sustain technology capability. This scenario is expected to lead to low degree of competitiveness.

Therefore, companies need to be able to develop their global supply chain capabilities to enhance global supply chain competitiveness which impacted by cost, price, quality, timely delivery and flexibility. The challenges and issues have necessitated local manufacturers to find new ways to improve their global competitiveness by changing their operations strategies. Some of the strategies adopted include supply chain management and information sharing. The next chapter discusses the concept of supply chain practice and it impacts the global competitiveness of manufacturing industry.

CHAPTER 3: LITERATURE REVIEW - CONCEPT OF GLOBAL SUPPLY CHAIN MANAGEMENT & INFORMATION SHARING

3.1 Introduction

Local grown Malaysian manufacturing firms are facing great challenges as they enter the international markets. Intensifying competition, evolving consumers' demands for better and cheaper goods and services as well as faster delivery have made global operations more complex to manage and coordinate. More recently, the interest in supply chain management and information sharing have also increased within the sector. Local companies seeking to benefit from globalisation need to address their supply chain capabilities in order to gain global operations competitiveness. This chapter attempts to firstly review the literature from the area of global supply chain management and information systems. The chapter introduces the concepts of global supply chains, illustrates how information sharing could help manage the supply chain effectively. Following this, the chapter reviews the supply chain capability factors that may drive the companies to engage in information sharing practice and achieve global competitiveness. The chapter concludes with a discussion on knowledge gaps that exist in the literature.

3.2 Supply chain overview

A supply chain could be defined as a network of firms working together, through which raw materials are acquired, transformed and delivered to customer worldwide (Chopra & Meindl, 2001; Christopher, 1998; Mentzer et al., 2001). As indicated in Figure 3.1, supply chains typically linked a set of three or more companies either in the upstream or downstream flows of products, services, finance and information, with the main objective - profit maximisation. The upstream part consists of firms that supply materials to the focal firms, while the downstream part consists of organisations that are involved in distributing finished products to customers. The integral part includes the internal processes and activities involved in transforming raw materials to finished products. Analytically, a typical supply chain (Figure 3.1), is simply a network of materials, information and service processing links with the supply, transformation and demand features.

Therefore, in sum supply chain is a combination of processes, functions, activities, relationships and pathways along which products, services, information and financial transactions move in and between companies. The supply chains consistof suppliers, manufacturing centres, warehouses, and distributioncentresas well as sales offices. Complexity of the supply chains makes the development and managing a process along the various nodes a challenging task (Gattorna, 2006, Simchi-Levi, Kaminsky & Simchi-Levi, 2008).

The term supply chain management appears to have several underlying themes in literature (Table 3.1). Some studies conceptualise supply chain management from the

perspective of purchasing and supply functions while others focus on the logistics and transportation views. For instance, Schary and Skjøtt-Larsen (1995) and Bhattacharya, Coleman, Brace and Kelly (1996) define SCM as an integrative approach in dealing with the planning and control of the flows of material from suppliers to end customers. Meanwhile, Lambert and Cooper (2000) explicitly include the customer perspective by defining SCM as an integration of business processes from end users through original suppliers that provides products, services and continuous information flow as added values for customers. Researchers have also used supply chain management to describe strategic, inter-organisational issues and management information systems (Mentzer et al., 2001; Lambert & Cooper, 2000).

As in Stock and Boyer (2009) mentioned in their study, a detailed analysis of the definitions and descriptions resulted in the identification of several themes and sub-themes that occurred repeatedly throughout the dataset. They determined the themes into the three broad themes constituting the key activities, the benefits, or the constituents associated with SCM. Stock and Boyer (2009) defined SCM as:

"The management of a network of relationships within a firm and between interdependent organizations and business units consisting of material suppliers, purchasing, production facilities, logistics, marketing, and related systems that facilitate the forward and reverse flow of materials, services, finances and information from the original producer to final customer with the benefits of adding value, maximizing profitability through efficiencies, and achieving customer satisfaction."

Therefore, supply chain management means managing of the series of activities concerning the planning, coordinating and controlling movement of materials, parts and products from the suppliers to the customer. This includes the management of material, information and financial flows in the supply chain. The decisions are made at strategic, tactical and operational levels throughout the supply chain.

A review on the supply chain processes however indicate that there are various business activities involved in managing the network (Figure 3.1). These include logistics, demand forecasting, sourcing and supplier management, production and assembly as well as after sales support (Table 3.2). The network is not merely the movement of goods from a supplier. Yet, it involves much more as it is important for firms' supply chains to be able to understand the value-creating activities and be able to respond quickly to any fluctuations in customer demand and uncertainty occurring along the network. In managing supply chain network, each firm may interface some of its internal activities with other members of a supply chain. Conventional strategic management, which focuses on individual organisations as the competitive unit in the industry, is no longer a key to a sustainable, competitive advantage.

The supply operations network has a great impact on a company's performance and profitability. The business environment is global and often there is situation where the company's operations network (manufacturing, distribution, sourcing) needs to be restructured or expanded. Designing the network is a complex task and multiple factors need to be taken into account when making the decisions. According Blomqvist and Laiho (2012) there are at least three categories of companies' targets which may lead to the need to redesign operations networks: 1) Improvement of competitiveness through

an improved utilisation of the global network and global resources 2) Improved competitiveness through more focused, differentiated resource combinations (improved fit). 3) International expansion to reach new markets, customer groups or new geographical areas. Designing operations networks includes strategic decisions which need careful preparation and planning. Company's operations strategy should be aligned with the corporate and business strategy. Within supply chains the structure and the strategy of the network need to be also aligned with the markets. Long-term strategic decisions like location, make or buy, plant focus and plant role, technology as well as planning and control systems are essential when designing the operations network.

Table 3.1: The Taxonomy of Supply Chain Management Definitions

	AUTHOR	Coverage of the Definition					
		I	**II**	**III**	**IV**	**V**	**VI**
1	Morgan (1996)		√		√	√	
2	Christopher (1998)	√		√		√	√
3	Lambert, Cooper and Pagh (1998)	√	√			√	
4	Monczka, Petersen, Handfield and Ragatz (1998)		√				√
5	Van Hoek (1998)		√				√
6	Tan, Kannan, Handfield and Gosh (1999)		√	√	√		
7	Council of Logistics Management (CLM) (2000)	√					√
8	Global Supply Chain Forum (GSCF) (2000)		√	√	√	√	√
9	Nunlee, Qudlls, Rosa (2000)	√		√		√	
10	Mentzer et al. (2001)						√
11	Spekman, Spear and Kamauff (2002)					√	
12	Stadtler and Kilger (2002)	√	√				√
13	Larson and Halldorsson (2002)	√		√			
14	Chan, Perrig and Song (2003)						√
15	Chopra and Meindl (2003)	√					√
16	Trent (2004)	√		√			√
17	Ellram, Tate and Billington (2004)	√		√			
18	Ohdar and Ray (2004)		√	√	√		√
19	Fawcett, Osterhaus, Magnan, Brau and McCarter (2007)	√	√	√	√	√	√
20	Stock & Boyer (2009)	√	√	√	√	√	

Key: I – Management philosophy/ managing processes, flows and activities in the supply chain
II- Integration of key processes; III-Coverage is from end-user to initial supplier
IV-Provision of products and/ or services; V- Value addition/ creation/ delivery; VI- Collaboration

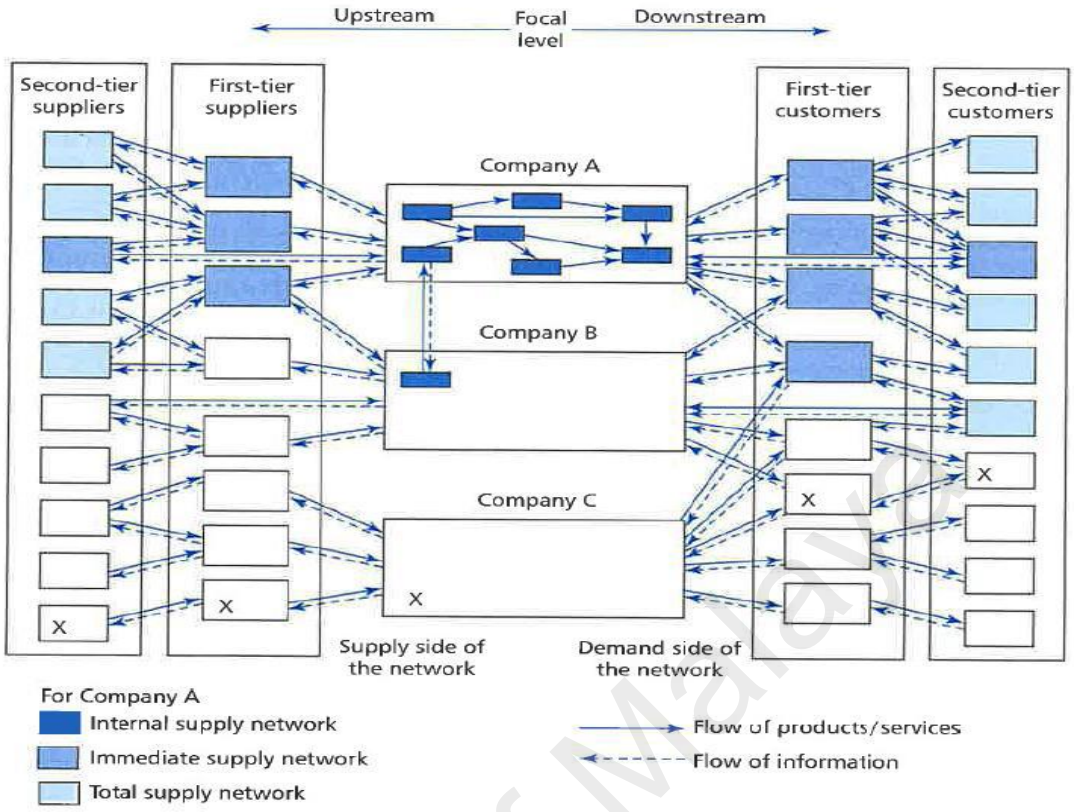


Figure 3.1: Supply Network (Slack & Lewis, 2008)

Management decisions also play a role in determining the choice of structure, partners and processes that flow towards the customer, as does materials and products. In principal, all information need to be availed to all participants in the supply chain (Mouritsen, Skjott-Larsen & Kotzab, 2003) as operating an integrated supply chain requires continuous information flows that assist in creating the optimum product flow (Lambert & Cooper, 2000). Supply chain management coordinates all these processes and activities to fulfil customer requests. Given these, this study refers supply chain management as the process of creating value chain in designing, developing, optimizing, and managing various processes including sourcing of raw materials, transforming materials into finished products or services, and delivering them to end.

Table 3.2: Supply chain business processes

Processes	Descriptions
Logistics	Associated with receiving, storing and disseminating inputs into the products, as well as finished goods to the buyer
Demand forecasting	Estimation of unit sales for a specified future period, based on historical data and patterns
Inventory management	Process of monitoring and maintaining the lowest possible level of stock, without compromising customer requirements, which are based on the output of the demand forecasting process.
Sourcing and supplier management	Identifying and selecting suppliers, processing, expediting and follow-up orders, inspecting received goods, processing payment and evaluating the performance of suppliers
Production and planning	Determining the unit of products that are necessary to produce to meet customer requirements, allocating available facilities and producing finished goods
Marketing and Sales	Promoting a product or providing means by which purchasers can buy the products/services and inducing them to do so
Service	Providing service to enhance or maintain the value of products - installation, repair, and training.

The concept of creating value in the value chain provides a systematic way of examining how a set of activities contribute to customer value and thus the overall competitiveness of a firm (Porter, 1985). Its application has been extended to intangible areas such as the innovation value chain focusing on the generation, conversion and diffusion of ideas (Hansen & Birkinshaw, 2007). And, since each level of a supply chain focuses on a compatible set of objectives, redundant activities and duplicated effort can be reduced with adoption of supply chains practices. This approach further facilitates open sharing information. Information sharing is an activity while visibility is a potential outcome of information sharing. This will lead to a more effective supply chain (Barratt & Oke, 2007) and increased ability to jointly meet end-user's needs.

3.3 Value Chain Network

The value chain network perspective is referring to internal value creating activities as well as external activities facing networks (Allee, 2000). Internal value networks include activity- focused sets of relationships within and among work groups such as within and between the manufacturing, research and development, or sales departments, and between and among the various work groups that make up the organization. Furthermore, external-facing value networks include those between the organisation and its suppliers, its investors, its strategic business partners and its customers. In addition, there are other networks cross organisational and industry boundaries, such as innovation networks or networks of people with the shared purpose in creating a social good or outcome.

The value chain network was usually focused on supply chain, using frameworks, scorecards, and variations of supply chain models to describe supply chain networks (Bovet & Martha, 2000). In other words, the supply chain becomes value chain. Value and cost not only just created by the focal firm in the network but by all the entities connected in each other. The value network approach can be applied to small purposeful networks, such as a work group or project team, as well as to larger and more complex networks. Participants in a value network, either individually or collectively utilize their tangible and intangible asset base by assuming or creating roles that convert those assets into more negotiable forms of value and can be delivered to other roles through the execution of a transaction (Allee, 2000). Moreover, the true value of deliverables received is realized by participants when they convert them into gains or improvements in tangible or intangible assets.

3.4 Global supply chains

Any supply chain that involves products, technologies, customers, suppliers, plants and distribution centres that spans across multiple countries are viewed as global supply chain (OECD, 2002). Intense international competition owing to the trade agreements, relaxation of trade barriers and increased accessibility to consumers worldwide have spurred the interest in global supply chain management. Companies are not only expanding through the exports of products to other countries, yet they are also locating their facilities overseas (Murray, Kotabe & Zhou, 1995). In many industries, markets have truly become global. Thus, companies have and will continue to increase their degree of international sourcing and product distribution. The business environment in which most companies operate has changed significantly. Decisions affecting international operations and profitability must be made with accurate, timely, and comprehensive cost information. Digital Equipment Corporation is among the companies that had recognised the importance of global supply chain practice during the 1980s erra (Arntzen, Brown, Harrison & Trafton, 1995).

The accurate measurement and management of costs for supply chain operations are essential for the successful operations of the business. Since global supply chains can reflect as much as 90 per cent of a company's cost base (Institute of Management Accountants, 2008), complete knowledge and understanding of these costs are critical for effective business management and company performance. Companies are driven to develop dispersed manufacturing networks for many reasons, including achieving lower costs, accessing new markets, seeking strategic assets such as a skilled workforce, special technologies, and others (MacCarthy & Atthirawong, 2003).

The global supply chain has evolved, and can take advantage of the unique comparative advantages of differing countries. This structure needs to be properly coupled with the procurement, processing, and distribution activities of a multinational firm. Given the reduced trade barriers, it is now possible to gain the comparative advantage that differing nations should offer. The various value-adding activities of a supply chain can be strategically dispersed among various countries and coordinated to produce the competitive advantage. Global supply chain management (GSCM) allows firms to make full use of intellectual capital and knowledge base for research and development, engineering and market research (Motwani et al., 1998). Such strategy allows corporations to take advantage of diversity in the international environment by recognizing and exploiting regional differences. These include the level of product and process technology expertise, labour force capabilities, input factor costs, local tax rates, and the capabilities of offshore vendors (Cohen & Malik, 1997).

Nevertheless, since global supply chains involve worldwide interests rather than local or national direction, they are more difficult to manage as compared with domestic supply chains. There are number of global supply characteristics, which add more difficulties to a domestic network. They include large geographical distance, economical, political risks infrastructural insufficiency, language and communication barrier (Manuj & Mentzer 2008; Sajadieh, 2009), which are discussed in the following sections.

(a) ***Large geographical distance***

International operations are associated with larger geographical distances; as firms increase outsourcingof their productions globally. Companies may outsource some of their activities to third parties and locate their supply chains outside of their home country, and hence may face higher degree of uncertainties leading to longer lead time. Moreover, increased geographical distance may also affect forecasting accuracy. In a global supply chain, firms are typically not able to communicate directly with the end-consumers, making them lose touch with actual market demand (Christopher, 2005). Forecasting based on orders received instead of end-consumers' demand data may become inaccurate as it moves farther up the chain, causing a bullwhip effect (Lee & Whang, 2000). This phenomenon occurs when small changes in consumers' demand are translated into wide swings in demand experienced by companies. Thus, firms at different stages or nodes in the supply chain may have different pictures of end-consumers demand, increasing the possibility of supply chain coordination breakdown. The increased time required in obtaining the product from a large and diverse global market network generally required many companies to order large quantities of components to cater for the often irregular supply and demand patterns as well as due to the import duties imposed on the customer from using overseas suppliers. The costs associated with holding high stock levels along with the costs of maintaining the global supply chain network often contribute to the highest total acquisition costs (Thomas & Barton, 2006).

(b) ***Infrastructural insufficiency***

Countries around the globe have considerable differences. Setting up operations in developing countries for instance, may provide challenges as they are lacking in terms of transportation and telecommunication infrastructure such as ports, roads and airports (Song & Panayides, 2008). In the third world countries, specifically, poor intra-country links which are usually sparse have lead to a costly new inland markets access, reducing the degree of global supply chain competitiveness. While domestic supply chains commonly involve single shipping mode, operating on a global scale involves multi-modal transportation. These infrastructural differences may tender manufacturers to alter and reconsider strategies used in home countries. Tight regulations and bureaucratic hurdles in some nations could be extremely time consuming; and may force many manufacturers to employ third-party logistics companies to speed up the process. Availability of quality human resources, suppliers, equipments and technologies further add challenges to the local manufacturers wishing to enter the international arena.

The complexity of booking, cross-border tracking and other transactions involving global logistics processes increases the need to build necessary telecommunication and information systems (Steffanson, 2006). Yet, some technological systems such as EDI which have been developed independently in the various trading block have led to compatibility problems in global logistics process. For instance, Europe adopted Electronic Data Interchange for Administration, Commerce and Transportation (EDIFACT) standards, while the US utilised the American National Standards Institute. Hence, international firms seeking to participate in the technology

integration to manage their global operations have to establish several different private formats between their supply chain partners. Moreover, global logistics which commonly entails several modes and carriers, lead to difficulty in seamless EDI implementation throughout the transportation pipeline.

(c) Economic and political issues

Political factors such as governments' stability, establishment of regulations, tariff and duties changeability are some of the factors that may need to be considered in the global supply chain (Golgeci & Arslan, 2014). Currency exchange rates for instance, may influence the price of products and services purchased in the supplier's currency, impacting the financial performance of the supply chain. Hence, manufacturers need to trace any changes to continuously make correct decisions on the time and quantity of purchasing. Instability caused by natural disaster such as typhoons, earthquakes and tsunami may further cause disruptions to global supply chains.

(d) Language and communication barrier

Diverse cross border business practices and customs often create a communication challenge to businesses operating in global supply chains. Variations in cultural practices may lead to error in communications between various nodes in the chain. Finns for example, view Just-In-Time practice differently from the Japanese (Matsuura, Kurosu & Lehtimaki, 1995). Suppliers, logistics companies, manufacturers and other supply chain members may have different anticipations on how, where and

when to convey information. Differences in communication methods combine with language and cultural constraints may result in higher order-taking and fulfilment error rates (Chow et al., 2008). Moreover, the organisation needs to evaluate the human resources on a global scale and provide training that encompasses language and cultural know-how.

(e) ***Unique demand patterns***

Manufacturers entering other countries will face unique demand patterns such as price, market share, and order size as well as product lifecycles. They may need to alter their product offerings and produce huge varieties to suit the various local needs. Yet, increasing product varieties have been argued to have an impact on the supply system, in which it may potentially add complexity to the configuration and coordination of supply networks. With growing product differentiation, maintaining and ensuring quality becomes critical. Growing consumer concerns on social and environmental issues also leads manufacturers to tightly coordinate with their supply chain members. Firms expanding into international market often suffer from the lack of necessary insights about the market and customer value perceptions in host country (Flint, 2004). In this regard, knowledge and information are needed to successfully operate and make appropriate strategic decisions in global markets.

Notwithstanding this, the growing importance of global buyers that possess powerful role such as Wal-Mart and Tesco for instance may dictate the operations of global supply chains by requiring suppliers to meet certain standards (Gereffi & Lee, 2012). This may pose risks and challenges to the local manufacturers. In the food

industry for instance, large retailers may prefer to work with large-scale suppliers that are capable of meeting stringent and costly requirements to ensure food safety and quality (Lee, Tae Kim & Choi, 2012). This standard-based consolidation may marginalise small scale manufacturers' ability to comply due to high costs and lack of required skills.

Given the risks discussed, extending a supply chain beyond countries borders clearly lengthens the chains, resulting in a greater exposure to various issues including border crossings, multiple modes of transportation, different government systems, and technology and security concerns. Large geographical distances associated with global supply chains not only increase transportation costs, yet also complicates other operational decisions. Different local cultures, languages, laws and currencies lessen the effectiveness of supply chain processes, which include demand forecasting, material planning, and supplier relationship management. Furthermore, shortage of resources such as infrastructure, expertise and support services (e.g. bank, logistics) particularly in developing countries may hinder efficient global supply chain operations. Therefore, as the activities, nodes and linkages spread out around the globe, firms need to carefully coordinate the operations. The difficulties and risks arising in global supply chains may erode the competitive advantage of such operational strategy.

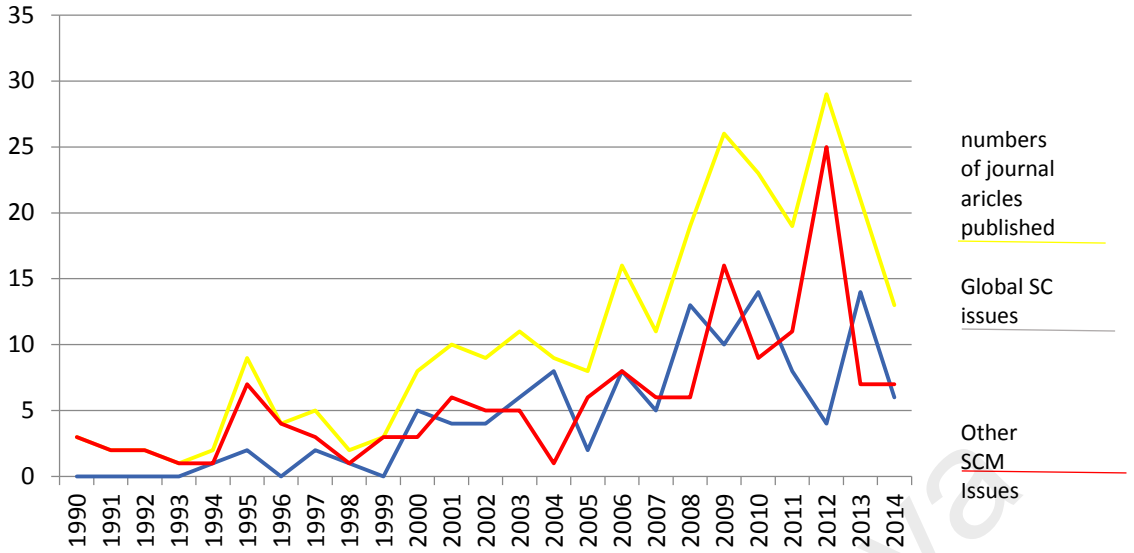
The above issues mark as a fundamental change in the way in which the company will need to manage their manufacturing operations and continue to compete at the highest level. The changes certainly place greater pressure on the companies' global supply chain. They need to become more responsive to support more flexible and leaner manufacturing environment. Moreover, as local firms are entering international

markets, it is pertinent to identify the salient factors that may affect theirglobal supply chain competitiveness. The next section discusses the prior related research.

3.5 Prior research in global supply chain context

Content analysis was used to identify the research gaps in the global supply chain literature. This study focused on journals in supply chains, logistics and transportation, operations management and general management areas from January 1990 to December 2014 using "global supply chain" as the key word. Several databases which include Science Direct, Taylor & Francis, Emerald, Inderscience and Blackwell Synergy were utilised. They were used as a reference base as most well-refereed articles in industrial management are found in these databases. Moreover, it was found that these databases are ranked as making the highest contribution to the supply chain and logistics discipline. Similarly, this study discarded those articles that do not belong to any of above mentioned databases.

Two hundred sixty five articles were reviewed and classified according to the research purpose, year of publication, methodology, country of study and findings. As illustrated in Figure 3.2, the number of publications in the domain of global supply chains is growing with years, implying that more researchers are undertaking research in this area.



Year 1900/2000	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14
Number of Articles Published	3	2	2	1	2	9	4	5	2	3	8	10	9	11	9	8	16	11	19	26	23	19	29	21	13
Global SCM Issues	0	0	0	0	1	2	0	2	1	0	5	4	4	6	8	2	8	5	13	10	14	8	4	14	6
Other SCM Issues	3	2	2	1	1	7	4	3	1	3	3	6	5	5	1	6	8	6	6	16	9	11	25	7	7

Figure 3.2: The Number of Journal Articles Published in the Domain of Global Supply Chains

While this number is growing, articles researched in global supply chain issues however are reported to be not as predominant as local or domestic supply chain studies. In total, there were only 11 articles published in this field from 1990 to 2000. The number however has grown tremendously in the next 10 years to 117 articles. Starting from 2011 to 2014 the number however has reduced to 32 articles. Yet, since the last period only contains publications for 4 years only, it is premature to comment whether the trend continues to rise or decline. Despite this, it is plausible to make inferences that the interests in global supply chain heightened up after 2000. Some scholars associated this development with the terrorist attack in the U.S, the rise of global supermarkets and private standards in dictating the way the chains are operating (Gereffi & Lee, 2012). Growing concern on the link between economic upgrading and significant deterioration of labour conditions or social downgrading has also contribute

to the rise of global supply chains, in which it has become a major concern for many multinational corporations (Barrientos, Gereffi & Rossi, 2011).

The literature review reveals that many global supply chain studies that were published have used conceptual and empirical methodology (Table 3.3). The longitudinal study appears to be the least popular method used in this field of research. This is expected as this type of research is innately difficult and costly to conduct, particularly in business setting.

Table 3.3: Summary of Total Articles based on research methodology

Methodology	**No. of papers**	**Percentage**
Perspective	6	2.3%
Conceptual	66	24.9%
Descriptive	118	44.5%
Empirical (modelling)	12	4.5%
Empirical (survey/exploratory cross sectional)	36	13.6%
Longitudinal	3	1.1%
Exploratory (case study)	24	9.1%
Total	**265**	**100%**

While researchers have began to concentrate on global supply chain research over the last two decades, the theoretical reference to explain the issues in this area is limited, with majority of them are anecdotal and do not use any established theoretical framework. Furthermore, many of them were concentrated on resource-based view theory to justify their framework. Yet, some scholars have questioned the usefulness and applicability of this theory (Ambrosini & Bowman, 2009). They argued that this theory does not fully explain why some firms that have substantial resources and capabilities have failed to refresh and change them in turbulent and volatile environment.

Table 3.4: Summary of Total Articles Based on Research Theories Employed

Theory	Number of Articles	Percentage
None or not specified	61	52.0%
Resource-based view	9	7.7%
Contingency theory	3	2.6%
Transaction cost theory	4	3.4%
Organisational theory	2	1.7%
Agency theory	1	0.85%
Game theory	2	1.7%
Internalisation theory	8	6.8%
Value chain theory	3	2.6%
Social capital	1	0.85%
Theory of quality management	3	2.6%
Theory of swift	1	0.85%
Network theory	3	2.6%
Organisational learning theory	1	0.85%
Social network theory	1	0.85%
International economics	2	1.7%
Strategy-structure-performance	1	0.85%
Political economy paradigm	2	1.7%
Traditional agency theory	1	0.85%
International marketing	1	0.85%
Option pricing theory	1	0.85%
Socio-technical systems theory	1	0.85%
Duality theory in programming	1	0.85%
Economic incentive theory	2	1.7%
Cluster theory	1	0.85%
Customer value theory	1	0.85%
Total	117	100%

Next, this study analyses the articles based on the geographical distribution. Considerable numbers of articles are conducted using samples from advanced economies such as the U.S., Europe and Australia. A major reason for such trend is perhaps due to the limited knowledge of supply chain management approach in the emerging economies region (Balan, Vrat & Kumar, 2006). Nevertheless, this study found that the numbers of articles in this area of research from the developing economies continue to increase, particularly in Asia, with the most frequently researched countries are China, India and Taiwan. With many emerging economies now are playing prominent roles in the industries as exporters and as new markets, there is a

pressing need to examine and develop appropriate global supply chain models for these countries including Malaysia. Some comparative analyses have also been performed to provide a cross country view of global supply chains (Table 3.5).

Table 3.5: Summary of Total ArticlesBased on Geographical Distribution

Geographical area	No. of articles	Percentage
United States	63	23.8%
Europe	48	18.1%
Australia	6	2.3%
Global	37	14%
Asia	46	17.4%
Africa	4	1.51%
N/A	61	23%
Total	265	100%

Further effort was made to classify the articles according to the global supply chain dimensions studied in the past literature. To categorise these articles, this study used Ginsberg and Vankatraman (1985) model. This model has suggested three different elements which include input, process and output. Input refers to the context of the literature, which describes internal and external contextual factors that may affect an organisation's strategy and practices. Process consists of global supply chain practices and strategy. Global supply chain practices describe the tactical day-to-day activities that a firm engage to execute its global supply chain strategy; while global supply chain strategy describes the overall plan and policy established to manage the sourcing, manufacturing and logistics functions. The last element-output describes the outcomes gains or performance attained by engaging in certain practices and strategies. Specifically, majority of the articles that focus on the outcomes did not attempt to link this element with the factors, strategy or practice.

Table 3.6: Content of the articles

Author(s)	Year	Internal and external contextual factors	Global Supply Chain Strategy	Global Supply Chain Practices	Outcomes
Klassen and Whybark	1994	√			
Rao and Young	1994	√		√	
Arntzen et al.	1995			√	√
Levy	1995			√	√
Vidal and Goetschalckx	1997			√	
Motwani et al.	1998			√	
Gereffi	1999	√			
Bhatnagar and Vismanathan	2000			√	√
Ritchie and Brindley	2002	√			
Harvey and Richey	2001	√		√	
Shore	2001	√		√	
Vidal and Goetschalckx	2001			√	
Kaleka	2002	√			√
Morash and Lynch	2002	√			√
Pontrandolfo et al.	2002		√	√	
Reyes et al.	2002			√	√
MacCarthy and Atthirawong	2003	√	√		
Prasad and Sounderpandian	2003	√		√	
Sila and Ebrahimpour	2003	√		√	
Tyan	2003			√	
Yeniyurt	2003				√
Zeng and Rossetti	2003			√	
Closs and Mollenkopf	2004				√
Flint	2004			√	
Foroughi, Kocakulah and Perkins	2004				√
Min and Guo	2004	√			√
Yoon and Sil	2004			√	√
Beresford, Pettit and Whittaker	2005			√	√
Gereffi, Humprey and Sturgeon	2005	√			
Sousa, Shah and Papageorgiou	2005			√	
Hong, Noh and Hwang	2006	√		√	√
Balan et al.	2006	√	√		
Christopher, Peck and Towill	2006			√	
Li and Lin	2006			√	√
Mefford	2006	√		√	
Stratton and Warbuton	2006	√	√	√	√
Tan, Smith and Saad	2006			√	
Chen, Yang and Li et al.	2007			√	√
Ismail et al.	2007	√		√	√

Author(s)	Year	Internal and external contextual factors	Global Supply Chain Strategy	Global Supply Chain Practices	Outcomes
Ritchie and Brindley	2007			√	
Thomas and Barton	2007	√		√	
Gunasekaran, Lai and Cheng	2008		√	√	√
Babbar, Addae, Gosen and Prasad	2008	√			√
Cagliano, Caniato, Golini, Kalchmidt and Spina	2008	√		√	√
Kumar, Maheswari, Kumar	2003	√	√		
Liargovas and Skandalis	2008	√			√
Manuj and Mentzer	2008	√		√	
Narasimhan et al.	2008		√	√	
Premus and Sanders	2008			√	
Rudberg and Martin	2008			√	
Sheu	2008			√	
Song and Panayides	2008		√	√	
Steinle and Schiele	2008			√	√
Tavasszy et al.	2008			√	
Wu	2008			√	
Andersen et al.	2009	√	√		
Bhatnagar and Teo	2009			√	√
Hameri and Hintsa	2009	√			√
Jiang et al.	2009	√			
Melem and Nordman	2009			√	√
Rugman et al.	2009			√	
Sajadieh	2009	√			
Shamsuddoha et al.	2009	√			
Tsai et al.	2009	√	√	√	√
Verma and Tiwari	2009	√			
Arnold et al.	2010	√		√	
Asree	2010	√	√		√
Bassett and Gardner	2010			√	√
Bhattacharyya et al.	2010	√			√
Enyinda and Gebremikael	2010				
Gunasekaran and Irani	2010	√			
Kumar et al.	2010			√	√
Lee and Wilhelm	2010	√	√		√
Mollenkopf et al.	2010			√	
Schoenherr	2010			√	
Song and Chatterjee	2010	√			√
Thun	2010	√		√	
Wang et al.	2010				√
Bayo-Moriones et al.	2011			√	√

Author(s)	Year	Internal and external contextual factors	Global Supply Chain Strategy	Global Supply Chain Practices	Outcomes
Christopher et al.	2011			√	
Dowlatshashi	2011	√		√	√
Hung	2011				√
Kuei et al.	2011			√	
Pazirandeh	2011		√	√	
Soltani et al.	2011			√	
Tse and Tan	2011			√	√
Youn et al.	2011			√	√
Danese et al.	2012			√	√
Li	2013			√	
Liu, and Papageorgiou	2013			√	
Fransoo, and Lee	2013	√			
Zhao et al.	2013			√	√
Caniato et al.	2013			√	√
Park et al.	2013	√			
Liu and Nagurney	2013			√	√
Liu and Zhuang	2013	√			
Cruz	2013		√		
Le and Lee	2013			√	
Harvey et al.	2013	√			
Danese et al.	2013			√	√
Cruz	2013			√	
Casson, M.	2013	√			
Damijan et al.	2013	√			
Jonsson et al.	2013			√	
Lee and Jung	2013			√	
Yeniyurt et al.	2013			√	
Purvis et al.	2013		√		
Lewis et al.	2013			√	
Shaw et al.	2013			√	
Park and Min	2013	√			
Ellram and Tate	2013	√	√		
Bassett and Gardner	2013				√
Vermeulen	2013	√			
Purvis et al.	2013				√
Blackman et al.	2013				√
Wiengarten and Fynes	2013	√		√	
Baldwin and Lopez-Gonzalez	2014	√			
Roh et al.	2014	√	√		
Marsillac and Roh	2014		√		√
Gawande et al.	2014	√			

Author(s)	Year	Internal and external contextual factors	Global Supply Chain Strategy	Global Supply Chain Practices	Outcomes
Bueno-Solano, and Cedillo-Campos	2014				√
Revilla, and Sáenz	2014	√		√	
Ortas et al.	2014	√			√
Gualandris et al.	2014			√	√
Huo, et al.	2014	√		√	√
Fisher, et al.	2014		√		
Donaghey, et al.	2014		√		
Ravenhill, J.	2014	√	√		
Kannegiesser et al.	2014	√			
Jia, et al.	2014			√	
Alali, and Teece	2014			√	
Liu, et al.	2014		√		
Tate et al.	2014	√	√		
Steven et al.	2014			√	√
Montgomery and Oladapo	2014	√			
Steenkamp	2014			√	

Out of these 128 articles (Table 3.6), only 22 studies have discussed the supply chain capabilities issues. Most of the articles look on the technology capability issues and strategic partnership, using the RBV theory. Table 3.7 highlights the details of the articles.

Table 3.7: Global Supply Chain Articles on Supply Chain Capabilities

Authors	Year	Supply chain capability factors	Theories Used
Bhatnagar and Vismanathan	2000	Information technology	None
Shore	2001	Information technology	None
Kaleka	2002	Supplier relationship	RBV
Morash and Lynch	2002	Customer demands-oriented	RBV
Yoon and Sil	2004	Logistics	None
Gereffi et al.	2005	Information technology	Transaction cost economis
Song and Panayides	2008	Partnership	RBV
Steinle and Schiele	2008	Supplier management	RBV
Wu et al.	2006	Information technology	RBV
Bhatnagar and Teo	2009	Logistics	RBV
Verma and Tiwari	2009	Knowledge	None
Arnold et al.	2010	Information sharing, knowledge	RBV

Thun	2010	Learning, trust, innovativeness	None
Danese et al.	2012	Supplier network	None
Fransoo and Lee	2013	Transportation	None
Harvey et al.	2013	Human capital	None
Yeniyurt et al.	2013	Human capital	None
Marsillac and Roh	2014	Product design	None
Huo et al.	2014	Information technology	None
A Al-Aali and Teece	2014	Entrepreneurial asset, top management skills, learning process	Dynamic Capability
Montgomery and Oladapo	2014	Human capital	None

3.6 Supply chain capabilities

Supply chain capabilities refer to a network's ability to integrate, build and reconfigure internal as well as external competencies to address rapidly changing environments (Teece, 2007). According to Day (1994) there is an explicit link between capabilities and exceptional profitability. Day (1994) classifies capabilities into three categories: (1) Outside-in processes capabilities refers to the group of capabilities that enables the company to compete by forecasting and acting on changes in markets through the development of sound relationships with suppliers, channel members, and customers. (2) Inside-out processes capabilities are those internal capabilities that enable the firm to exploit opportunities in the environment. In other words, they facilitate the company acting on information in a manner that brings value to customers and assures the organization viability in the long run. (3) Spanning processes capabilities relate to the processes that support the anticipated needs of patrons being fulfilled by the business. They do so primarily through integrating the outside-in and inside-out capabilities.

3.7 Information sharing and global competitiveness

While empirical studies exist to further our understanding of the global supply chain competitiveness, relatively little is known about the mediating role of information sharing in the global supply chain. Moreover, despite the facts that elements such as unique resources and good relationships may hold great potential for effective global supply chain operations, there are however inconsistencies observed in some studies. One suspected reason for this research finding could be because of the effect of a mediator - information sharing. In this study, information sharing is referred to mutual sharing and connectivity. Connectivity refers primarily to a company's ability to use technology to collect, analyse, and disseminate the information needed to enable supply chain decision-making. In a supply chain setting, technology linkages across organisational units as well as up and down the supply chain are particularly critical to sharing information. Researcher believe information sharing will help supply chain partners to make better decision-making process and higher levels of coordination and collaboration are possible (Sprague & Watson, 1979).

Information sharing refers to the mutual sharing of business and market information between supply chain partners (Wu, 2008). This information include inventory status, sales and forecasts data, order status, production and delivery schedules and capacity as well as performance metrics (Lee & Whang, 2000). Zhou and Benton (2007), while investigating the supply chain of 125 North American manufacturing firms, considered three aspects of information sharing: information sharing support technology, information content, and information quality when investigating the supply. For information quality, they identified nine aspects from the

literature: accuracy; availability; timeliness; internal connectivity; external connectivity; completeness; relevance; accessibility; and frequently updated information. Similarly, a study by Hsu et al. (2009) shows that inter-organisational information sharing quality has a positive impact on the supply chain integrated performance, and that information sharing quality should be multi-dimensional in terms of accuracy, timeliness, adequacy and credibility of information exchanged. Therefore, basically in supply chain information sharing rely on these three aspects.

Information is one of the most important resources powering global supply chain competitiveness, as this element is tied up with two critical factors - visibility and flexibility (Sajadieh, 2008). Visibility allows other members in the network to view accurate and timely data as well as information at different stages in the chain, enabling firms to strategically avoid any risks of delays and the need to keeping safety stock. In other cases also upstream partners are unable to forecast demand accurately and, as a result, make non-optimal supply and production decisions. Ultimately, the efficiency for all supply chain partners' decreases when companies allocate sub-optimum capacities and carry excessive inventory levels (Lee & Whang, 2000). To address this issue and reduce demand uncertainty, researchers argue that sharing information across several supply chain tiers could result in well-informed business decisions for the members of the extended supply chain (Chen et al., 2000; Sahin & Robinson, 2002; Ketzenberg et al., 2007; Yu et al., 2010).

However, implementing and benefiting from information sharing in supply chains may be rather difficult. Since global supply chains are associated with uncertainty, where markets and customers are dynamic, flexibility has become

increasingly important. As firms source and market their products around the globe, lead time in both inbound and outbound logistics has dramatically increased, and would result in a more uncertainty environment. Researchers have identified several barriers to increasing information sharing in supply chains, although their analytical focus is on the buyer–supplier dyad. Issue like lack of information quality, which can be determined by accuracy, timeliness, credibility and proper formatting of the information, non-reliable or validate information will just make an information has no value for the receiving partner (Lee & Whang, 2000; Moberg, Cutler, Gross & Speh, 2002; Li et al., 2006).

Information sharing among different business processes and supply chain partners could effectively create a virtual supply chain (Knapp et al., 2006). This practice facilitates firms in coordinating various supply chain functions across the networks, in which forecasting data, production schedules, inventory status and production quality could be shared, reducing the risks of supply chain breakdown (Li et al., 2009). However another barrier in information sharing is the handling of confidential information and lack of trust. Supply chain members are often reluctant to share information because of fear of opportunistic behaviour, for example partners exploiting information for self-interest. Companies may, therefore, refrain from sharing information unless prevention of leakage to competitors is guaranteed. In a similar condition, there is a risk that shared information may negatively affect the competitive position of the buyer or supplier in relation to their competitors. This issue could negatively impact on firms' commitment to relationships and their willingness to share information with supply chain partners (Kembro & Selviaridis, 2015; Shore & Venkatachalam, 2003; Patnayakuni, Rai & Seth, 2006; Fawcett et al., 2007; Klein & Rai, 2009).

The level and quality of information exchange is dependent on the linkages established among the global supply chain, which can help enhance performance. In information sharing, collaborative supply networks are examining the value of information-sharing not only for opportunities to reduce inventory level, and supply chain costs but also for opportunities to improve the flow of goods, services and information and serve their customers better, which benefits the overall network (McLaren, Head & Yuan, 2002; Li et al., 2006; Samaddar & Kadiyala, 2006). However, a critical issue is how much information can be shared between partners of a supply network. Even though, IOISs, such as extranets, electronic data interchange (EDI), and electronic marketplaces provide the ability to share information easily, firms may not share information for various reasons (Premkumar, 2000). Information-sharing brings concerns of security, privacy, costs, and intellectual property (Li et al., 2006). Therefore, there are strong disincentives to share information unless supply chain managers are able to understand that shared information is equally beneficial to all parties of the supply network.

3.7.1 What to share with whom

The information sharing can be realising at different organizational levels between members in the supply chain (Taylor & Fearne, 2006). For example, supply chain partners could share forecasts, trends and plans to sustain and enhance company and supply chain competitiveness (Yigitbasioglu, 2010). As indicated in Figure 3.6, information sharing also helps supply chain managers in making efficient, effective and timely business decisions by reducing response time to unforeseen events and market changes (Guffrida & Nagi, 2006). Nowadays, the supply chain partners cannot avoid

information sharing. As in new technology era, advances in information technology (IT) have enabled the coordination and collaboration that underlie today's SCM strategies (Frohlich & Westbrook, 2001; Fawcett et al., 2007). The technology aspects of information sharing granted that firms are willing to share information (Cachon & Fisher, 2000; Lee et al., 2000; Fiala, 2005). The managers in supply chain networks rely predominantly on acquiring and installing the technology necessary to share information with the hope of achieving all the potential benefits. Supply chain partners found that although both aspects of information sharing are significantly related to operational and competitive performance, they tend to invest more heavily in connectivity than in willingness. Moreover, they found that firms that report high levels of both connectivity and willingness perform significantly better than firms that develop only one aspect of an information sharing capability (Fawcett et al., 2009).

Supplier management strategies based on necessary information, which produced through appropriate analytical approach, also have some strong effects on buyer's performance. By having access to information, firms could become aware of inexpensive and quality suppliers in other regions that other companies may not inform (Ndubisi et al., 2005). Spathis and Ananiadis (2005) also argue that an enterprise information system significantly contributes towards increased flexibility in information provision through effective monitoring and exploitation of the company's assets and revenue-expenditure flow. In the downstream parts, rapid and reliable information about buyers, sellers, and products are essential, in which it offers customers alternative to retail channel. The open flow of information gives consumers real choice in conducting their daily affairs. Customers are free to choose whether to make a purchase, how to pay for it, whether to open an account, reveal their identities, or disclose information at all.

Moreover, information sharing is a foundation for economic growth, in which it allows business entities to communicate with customers who are unfamiliar with their products or services but likely to be interested in using their products or services in a more cost-effective manner (Cate & Staten, 2000).

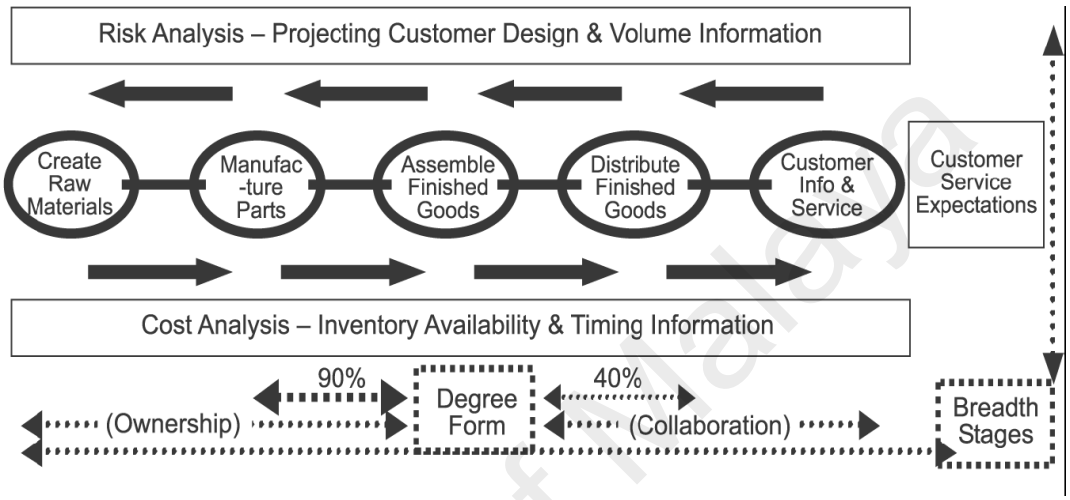


Figure 3.4: Flows of Information and Volume (Stonebraker & Liao, 2006)

Sharing information within a supply chain may encounter certain challenges. Among these barriers are confidentiality of the information shared, incentive issues, reliability and cost of information technology, anti-trust regulations, the timeless and accuracy of the shared information, and finally the development of capabilities that allow companies to utilise the shared information in an effective way (Zhao, 2002; Lee & Whang 2000; Khurana, Mishra & Singh 2011; Fawcett et al., 2008). One of the main barriers of interpersonal information sharing may be concerned about information privacy. A trusted network should be created for individuals to share information Razavi and Iverson (2006). Organisation members may lack trust in each other which may impede information sharing (Ardichvili & Gasparishvili, 2003; Cetindamar, Catay & Serdar Basmaci, 2005).

There has been various research activities carried out and address the business potential of sharing data across the supply chain. For instance, Clark and Lee (2000) have investigated the impact of continuous replenishment, which enables manufacturers to access the inventory status of retailers and plan shipments accordingly, instead of waiting for order placement. Similarly, Cachon and Fisher (2000) have analysed the impact of sharing demand and inventory data between a supplier and multiple retailers. They found that information sharing led to substantial savings of lead time and batch size reduction. Few empirical studies have also provided evidence that information sharing could influence the levels of integration and coordination across supply chain (Power, 2005). Chin et al. (2004) showed that effective information flow could leads to a more trusting environment and commitment bring partners to work together to solve problems. Roa, Phillips and Johnson (2006) suggested that by allowing information to flow accurately, organisations are able to communicate more accurately and effectively on their abilities to meet costs, deadlines and logistics, which enable greater opportunity to manage the flow of materials and lower inventory levels across the supply chain. For instance, companies such as Dell and Cisco are sharing information with suppliers and customers to reduce working capital and inventories. The flow of information through the supply chain enables them to match closely to customer demand and easily anticipate changes in the market places.

Notwithstanding these, there are also studies examined the impact of internal and external factors on information sharing in supply chain management. For instance, Li and Lin (2006) determine the effect of environmental uncertainty, intraorganisational factors and partnerships on information sharing. The study which collected data from 196 companies found that top management support, trust and shared vision between

supply chain partners as important ingredient in information sharing, while supplier and customer uncertainty reduce the level of information shared. In another study, Derocher and Kilpatrick (2000) found that firms with highly integrated departments have higher levels of information sharing practice, leading to stronger performance. Some studies have also highlighted the importance of trust in information sharing as this element facilitates more collaborative relationships among supply chain members and helps to reduce uncertainty (Martins, 2010).

3.7.2 How to share the information

The information sharing can be done through face-to-face contact, telephone and fax as well as email, EDI, Web-enabled portals, enterprise resource planning and data warehouse management (Hill & Scudder, 2002; Stefansson, 2002; Adewole, 2005). In the upstream and downstream information sharing, the supply chain can be facilitated by the used of internet for example in online book store which primarily includes the supply of functional products, predictable demand and stable supply processes (Lee, Kim & Moon, 2002). The capacity to manage information sharing across the supply chain has been significantly enhanced by the technological advances. It is depending on the willingness of the company to invest and to build, implement and integrate electronic transmission in supply chains. It may require large investments and practitioners often believe that certain information sharing is better off by face-to-face contact. Therefore, it is critical to determine the specific means of sharing for each piece of information and establish the proper exchange architecture (Adewole, 2005; Rai et al., 2012).

It is clear that information sharing enables strong supplier and customer coordination in various supply chain processed from acquiring raw materials through to delivering of finished products. Timely and accurate information exchanged between network members ensures smooth flow of materials along the chain as it reduces uncertainty, resulting in improved flexibility and visibility. In a competitive environment, the success of organisations will increasingly depend on their information to share with partners in their strategic decisions. However, managers are often uncertain about how to share the key information to enhance their business. As global supply chain have extended network involving various entities from different parts of the world, information sharing is thus a great importance. While the potential benefits of information sharing are well comprehended in the literature, this area of research is still limited. Table 3.8 highlights the previous research in the area of information sharing in global supply chain context.

Table 3.8: Research on Information Sharing in the Context of Global Supply Chain

No.	Author/s	Region/ countries	Methodology employed	Aims	Theoretical base	Research findings
1.	Lee et al. (2000)		time-series model	Develops a model that analyse the benefits of information sharing	None	- Manufacturers obtained significant inventory reduction costs.
2.	Arnold et al. (2010)	North American	Survey on 207 organisations that source from foreign firms- manufacturing, wholesale, construction, healthcare	Explore the impact of SC partners' capacity, B2B risks, global dispersion on information sharing practice	Inter-organisational, resource advantage	- increased levels of B2B risks have a negative impact on information sharing, while SC partners capacity has a positive impact on information sharing - The geographical location or cultural communalities has no impact on information sharing
3.	Prasad and Sounderpandian (2003)	-	Conceptual study	Provide a factors that may affect the global SC performance	International operations management	- Information systems as a vital ingredient in global SC coordination. - labour cost productivity, raw material cost, transportation costs, reliability of transportation modes, exchange rates, demand patterns and government incentives may emerge as factors that influence global competitiveness

Continue on next page

Table 3.8: Continued

No.	Author/s	Region/ countries	Methodology employed	Aims	Theoretical base	Research findings
4.	Li and Warfield (2011)	-	Conceptual study		None	-
5.	Masson et al. (2007)		multiples case study involving UK- based retailers that own production and source logistics services from China and Romania	Examine the agile supply chain practice adopted by UK clothing retailers	None	- agile supply chain was enhanced through the adoption of postponement activities. - Several risks that are identified in the clothing supply chain include inaccurate demand forecasting. - Information sharing appears to help firms in reducing the risks by increasing the chain visibility and provide transparent information between the retailers, distribution centres, garment manufacturers and logistics providers.
6.	Faisal, Banwet and Shankar (2007)	India	Semi structured interviews with 10 SME companies operating in brass, lock, leather and ceramic clusters that exports their products globally	Identify various information sharing risks that could impact supply chains	None	- Suggests that information security, forecast data, intellectual property rights and outsourcing practice as information risks that would impact supply chain management.

Continue on next page

Table 3.8: Continued

No.	Author/s	Region/ countries	Methodology employed	Aims	Theoretical base	Research findings
7.	Cheung and Myer (2008)		Multiple case study	Identifies potential opportunities and motivations as well as dilemmas that exist in global network	None	- suggests management fit, market fit, resource fit, shared identity, relational capital and flexibility as factors affecting knowledge sharing in global networks.
8.	Chow et al. (2008)	U.S and Taiwan	Survey involving manufacturing firms in the U.S and Taiwan	Investigate the relationship between supply chain management components (e.g. information sharing, communication, customer and supplier management) on organisational performance	None	- The practice of SC management differs in different countries as firms face different types of SC challenges in distinct environments. - Effective SC management through information sharing for instance, may enable companies to become more competitive in the new economy, thus significantly improving their performance.

Continue on next page

Table 3.8 Continued

No.	Author/s	Region/ countries	Methodology employed	Aims	Theoretical base	Research findings
9.	Reyes et al. (2002)	U.S	Case study involving Original Equipment Manufacturer (OEM) in the telecommunication industry that have implemented shared Advanced Planning and Scheduling Systems (APS)	Highlights the importance of inter and intra supply chain management integration though information sharing	None	- Information technologies play a critical role in providing a visible supply chains in which it does not help to reduce costs but stimulates revenue growth. - Firms need to have a common business model across the global supply chain and focus on people and technology
10.	Zailani, Premkumar, and Fernando (2008)	Malaysia	• Intercultural management and the need for proper information transfer • Requirements and consequences of cultural issues on the design of proper communication management • Conceptual approach exploring findings from psychology, sociology, organizational-anthropology and communication management	-	RBV	- Although the author mention about information sharing and information management, it does not appears in the discussion and not properly discussed in the literature.

Continue on next page

Table 3.8: Continued

No.	Author/s	Region/ countries	Methodology employed	Aims	Theoretical base	Research findings
11.	Thron, Nagy and Wassan (2006)	United Kingdom	Constitute an intermediate approach between traditional isolated level and fully transparent data sharing system		None	- Not appropriately discuss about the information sharing and data-sharing.
.	Mee-Shew Cheung (2004)	Tennessee	• Survey		Transaction Cost Theory	• Not emphasised on the operational level of supply chain and how internal achieved strategic outcomes through buyer-seller information sharing. • Information sharing mediated the perceived customer value in GSC. - Facilitating conditions relating to global environment factors and inter-organizational properties to enhance information sharing among global supply chain partners.
13.	Kotzab, Skjoldager and Vinum, (2003)	Denmark	Survey on supply chain environment factors facilitated the information sharing.		None	• Introduce e-supply chain strategy optimization model for entire supply chains in complex environmentsE-SCM involves information sharing with other parties to facilitate the integration of business processes
14.	Holten, Dreiling, Muehlen and Becker (2002)	Germany	Specifies inter-organizational business processes (SCOR) and information flows for operational control and best practices of supply chain design		None	Discussion is only in the entire supply chain partner and not discuss about global perspectives.

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Table 3.8: Continued

No.	Author/s	Region/ countries	Methodology employed	Aims	Theoretical base	Research findings
15.	Wisma, M. (2008)	Indiana, USA	• Engage with global supply chain management analysis		None	Identify global business management environment particularly in micro and macro cultural considerations
16.	Scholz-Reiter, Frazzon and Makuschewitzs (2008)	Germany	• Sustainability and effectiveness of global supply chains		None	Long-term learning process in intra and inter-organisation cultural.
17.	Visser (2008)	Netherlands	• Innovative logistics global supply chain		None	Issue of Logistics clusters and interaction between service firms among MNEs on the core competencies
18.	Hamacher, B. (2008)	Germany	• Lean global supply chains issue		None	Managing intercultural and perception of information management systems.
19.	Manuj and Mentzer (2008)	Tennessee	• Global supply chain risk management issue		None	Comprehensive risk management in uncertainty of logistics, SCM, operation management, strategy, and international business environment

Continue on next page

Table 3.8: Continued

No.	Author/s	Region/ country	Methodology employed	Aims	Theoretical base	Research findings
20.	Masson et al. (2007)	Edinburgh	• Agile global fashion industry supply chain issue		None	Cases of UK retailers based in two low cost locations; China and Romania
21.	Hesse, & Rodrigue (2006)	Germany	• Implications of global distribution network		None	Lack in Infrastructure capacity due to political and urban environment
22.	Thron et al (2006)	Canterbury	• Global and individual supply chain performance		None	Identify the level of collaborative engagement and impact
23.	Blowfield, (2005)	Boston	• Global supply chain expectations issue		None	Using the applicable set of policies, approaches, rights, and societal responsibilities to manage the issue.
24.	Prasad and Sounderpandian (2003)	Wisconsin	• Global supply chain efficiency issue		None	Identify the implications of information systems
25.	Ritchie and Brindley (2002)	Crewe, UK	• Global competitive model in terms of economic activity • Global supply chain management • Risk management Relationship marketing		None	
26.	Mason-Jones and Towill, (2000)	Cardiff	• Global supply chain performance		None	Managing uncertainty and reducing Bullwhip effect

Continue on next page

Table 3.8: Continued

No.	Author/s	Region/ countries	Methodology employed	Aims	Theoretical base	Research findings
27.	Fawcett et al.(2009)	USA	• Large scale survey methodology		Transaction cost theory	Advances in information systems – involving data capture, storage, analysis, and exchange technologies – make managing today's complex global SC networks feasible.
28.	Hong et al. (2011)	USA	• Empirical data from IMSS IV		Resource base view	Statistical results supports the positive relationships between supplier-oriented ECTs and supplier integration, between customer-oriented ECTs and customer integration, between supplier integration and flexibility and quality, and between customer integration and flexibility and quality.
29.	Elwan Ibrahim and Ogunyemi (2011)	Egypt	• structured in-depth interviews with subject-matter-experts (SMEs)		Resource base view	The results show that upstream (supplier) and downstream (customer) Linkages and Information sharing to be positively related to both supply chain performance and Export performance.
30	Selc¸uk Perc¸in (2008)	Turkey	• Conceptual paper		Transaction cost theory	Managers are often uncertain about how to share the key information to enhance their business. This research proposes a methodology for both managers and a group of organizations in a supply chain to make decisions on which types of information they should share with their partners.

3.8 Global Supply Chain Competitiveness

An organisation has attained competitive advantage, when through its offering; it has able to create more value for its customers in comparison with rival firm (Goshal, 1987). In the manufacturing sector, competitiveness is defined as the ability of production system to compete on basic dimensions such as quality, cost, flexibility, speed or time and delivery (Safizadeh et al. 2000). One would expect that operational excellence to be supported by supply chain capabilities. Prior research have categorizes supply chain competitiveness into delivery and flexibility. Global organisations enhance their competitiveness and financial performance by focus on lower costs, focus on high quality, flexibility, improved delivery dependability, and quick response time. In turn, these will lead to better competitive position and better sales and profits (Jin Su & Vidyaranya, 2012).

It is very important for a firm to choose an appropriate set of sources for inter-organisational competitive advantages so that it may successfully accomplish its supply base evolution. While majority of early global firms have focused on exporting products, they have little concern on their delivery capability. Delivery capability refers to supply chain capacity to meet quoted and anticipated dates and quantities in both make-to-order and make-to-stock environment.

Mapes, Szwejczewski and New (2000) highlighted that as companies aim to reduce uncertainties, they increase the chances of obtaining more dependable deliveries with a minimum amount of just-in-case resources such as overtime workers and safety stocks. Delivery performance is argued to be gaining recognition as viable competitive weapons (Fawcett & Clinton, 1997). Firms that are able to develop high level of cross

functional delivery performance consistently outperform their counterparts then thosewho are failed to recognise the importance of a delivery capacity and unable to organise their resources to achieve a delivery competence. The further analysis in this study also found that the availability of useful information for decision making and the comprehensiveness of delivery function on a firm's network plan design and management are very important.

While globalisation has yielded many economic benefits, it has also increased complexities encountered by supply chain managers due to the fact that decision making must encompass multiple players located in different geographical locations. One key reason for these complexities is the considerable distance that products must traverse between different supply chain entities. Rising competitive pressures have also forced firms to enhance their supply chain flexibility in order to rapidly adapt to environmental variations (Upton, 1994). Flexibility refers to a supply chain capacity to change production volume and production mix. Christopher (1992) argued that when it comes to the whole supply chain which comprises supply network, production firms and delivering enterprises, flexibility is taken into account as an important and relevant factor.

According to Wadhwa and Rao (2003), firm's efficiency can be improved through supply chain's flexibility which ultimately enhances the performance of supply chain. Moreover, flexibility of the supply chain is itself affected by the way supply chain is designed. Indeed, supply chain flexibility is one of the most important considerations in designing the supply chain (Bertrand, 2003). Many studies have also investigated the impacts of flexibility together with information sharing such as Quinn (2006), Chow et al. (2008), as well as Wadhwa (2003). Flexibility may contribute to

delivery as well. Firm's ability in changing delivery dates is a consequence of its flexibility (Beamon, 1999).

In global supply chains with long replenishment lead times, it could possibly cause large imbalances due to the greater discrepancy that would occur between the forecast and actual demand realisation over the lead time. Globalisation of supply chain requires coordination of efforts for information flows, inventory management, and partner relationships. The holistic management of a supply chain network can certainly contribute to significant profit, but poses significant challenges to manage successfully. The emergence of global supply chain networks has emphasised the inter-connected dependencies of these individual supply chains to each other, as well as the dynamism of global markets (Power, 2005). This complexity of global exchanges brings with it elements of challenge and risk, yet also opportunity to prosper (Houghton, Smith & Hood, 2009). Proper management of the supply chain and its partners can allow a firm to develop innovative technological advances, leverage current supplier capabilities, cut costs, and develop collaborative relationships that can support a long-term competitive advantage.

Based on these arguments and discussion, this study measures the global supply chain competitiveness by looking at the capabilities of a company in providing products and services at low cost, coordinate the supply chain, possess good workers, flexible as compared to the competitors.

3.8 Theoretical underpinning

Since one of the foci of this research is to analyse the global supply chain capability factors that influence the global competitiveness of a manufacturing firm and information sharing, this study adopted literature from the resource based, dynamic capability, and social exchange theory to explain the antecedents of global SC competitiveness and information sharing. In an effort to probe the often complex nature of supply chain issues, it is interestingly necessary to use concepts that are derived from outside operational management dimension. Borrowing theories from other field contributes in enriching and broadening Operations Managment as a discipline.

3.8.1 Resource-based View (RBV) Theory

Resources can be tangible or intangible in nature. Tangible resources include capital, access to capital and location (among others) while intangible resources consist of knowledge, skills and reputation as well as entrepreneurial orientation, among others (Runyan, Huddleston & Swinney, 2006). In this sense, Resource-based view (RBV) theory defends that, under imperfection of markets exists a diversity of firms and a variation in the specialisation degrees that provokes a limited transfer of resources which present type, magnitude and different nature (Feirerra, Azevedo & Fernandez, 2011). The main attention in RBV approach is resource and capability. Competitive advantage will be obtained by organisation that has asset or specific capability. Profitability of the company is decided by type, quantity, resource, and capability that have existed. Therefore, the main reason for firms' growth and success can be found inside of the firms, that is, firms with resources and superior capabilities will build up a basis for gaining and sustaining competitive advantage.

Resource-based theory argues that the key to improving a firm's performance depends on their internal characteristics. The differences in market performance of a firm are explained primarily by the distinctive resources and capabilities that are rare, valuable, inimitable and non-substitutable by rivalry (Barney, 1999). Day (1994) pointed out that RBV presents two sources of competitive advantage and firm performance namely firms assets and firm capabilities. He believed that these capabilities may provide a firm with competitive advantage through a focus on customer value creation. The argument significantly proved that capabilities are the glue that brings assets together and enables them to be deployed advantageously. And, noted that several of capabilities mentioned by Day (1994) are supply chain capabilities, which are critical in a global business competitive environment.

According to the theory, higher degrees of tacitness, complexity or specificity contribute to higher degrees of ambiguity, making it harder and costly for competitors to imitate (Bowman & Ambrosini, 2003). As argued by this theory, resources include both tangible (e.g. equipment) and intangible (e.g. process knowledge) assets (Grant, 1991) that facilitate the production and delivery of goods and services. Organisations commonly seek to acquire and exercise permanent or semi-permanent control over resources that can provide a competitive advantage over competitor. Yet, since firms may apply different levels of controls over various types of resources, they would be unique from each other, which should lead to different products or services offerings.

The RBV theory contributes to the analysis of global supply chain competitiveness by offering pertinent insights to how supply chain linkages and logistics capacities may facilitate firms in creating resources and capabilities. The increased globalisation for instance has raised the importance of logistics capabilities. In

the manufacturing industry involving international setting, logistics function offers opportunities to enhance the efficiency and productivity of production, in which it acts as a strategic core for businesses. In keeping pace with the intense globalisation, manufacturers therefore must look for new logistics capabilities to increase their planning capacity and improve customer service. The benefits arising from global SC for instance, could not be realised without co-developments in modern logistics services mainly underpinned by information technology in physical distribution and material management process. Poor logistics functions are associated with high transportation costs, large inventories and inventories costs, long and uncertain delivery times. Continuous flow of supplied inputs is not only crucial at the final stage, yet it is also critical in the production stage, in which shortages of raw materials could lead to underutilisation of capital intensive processing facilities and labour (Buzzel, 1983).

The RBV theory also highlights that when a firm creates linkages with supply chain partners to the extent that the competitors are excluded from forming the same connections with the same critical suppliers and customers, the resulting network may provide competitive benefits to the firm as this strategy may facilitate the flow and quality of materials along the chain, leading to accrued operational performance. For instance, by involving critical suppliers in the product design stage, manufacturers can ensure early commitment for uninterrupted supply of critical parts to the firm. In a *Fortune* 500, firms are able to bring a product from design to market within 24 months by involving their critical fuel tank supplier in the design of a small, light, versatile and easy to handle skid-steer loader for use at construction and ground care sites. Similarly, exclusive sourcing arrangements in which a firm commits to buying a large percentage of a supplier's output, in turn prevent competitors from accessing the same supplier or parts.

Many studies have incorporated the RBV theory to investigate SC competitiveness. Several authors (Lippman & Rumelt, 1982; Jacobsen, 1988; Day & Wensley, 1988; Grant, 1991; Barney, 1991; Rumelt, 1991; Day, 1994; Gordon et al., 2005; Janney & Dess, 2006; Runyan et al., 2006) when referring to the RBV, they do it more in a strategic context, presenting resources and capabilities as essential to gaining a sustained competitive advantage and, consequently, to a superior performance. For instance studies conducted by Arya and Lin (2007) have found that the sources of competitive advantages are not only from the internal resources owned by a firm itself but are also drawn from the external resources in the relational networks. In this context, the relational networks refer to the potential situation that provides a firm with access to resources, markets, information and technologies; with advantages from scale and scope economies; and allow firms to share risks and outsource value-chain stage (Gulati, Nohria & Zaheer, 2000). Learned, et al. (1969) and Porter (1985) adopted RBV from a strategic point of view considering a resource as a strength that firms can use to formulate and to implement their strategies. The resources and capabilities of the firm are the main competences for formulating strategy (Grant, 1991).

Table 3.9: Research Adopting Resource Based View Theory

No.	Author/s	Region/ countries	Methodology employed	Variables used	Research findings
1.	Iacavou, Benbasat and Dexter (1995)	Canada	multiple case studies using structured interviews with 7 small suppliers for government agencies	1. perceived benefits 2. organisational readiness 3. external pressure	- Both organisational readiness and perceived benefits are required for highly integrated systems. - Small firms are reluctant to integrate EDI into their operations since the implementation is too costly. - Subsidies from EDI partners greatly enhance the integration of EDI technology in supply chain operations.
2.	Seggie and Griffith, (2008)	New York	Survey involving 420 hotels in New York	Use resource-based view theory. Use a congruence approach to suggest that the alignment of resources with consumer needs in the globalized domestic market leads to competitive advantage for the firm.	- RBV can help company competitiveness - Global firm use RBV to gain competitive advantage
3.	Almarri & Gardiner (2014)	Dubai	Interview with Project Manager	• Highlight the link between RBV and competitiveness. i. Examine the areas of criticism and discuss their implications on organizations and on research. Highlight the importance of the RBV to the competitive advantage	The Resource-based View of organizations has gained its reputation as a vital theory since it combines the strategic and organizational insights on the firm's competitive advantage.

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Table 3.9: Continued

No.	Author/s	Region/ countries	Methodology employed	Variables used	Research findings
4.	Arya and Lin (2006)	U.S	semi structured interviews with key administrators at organizations that	• Network • Collaboration • Alliance	• Findings do not support the argument that collaboration outcomes decrease with partner similarity in terms of services provided. • Find support for the negative influence of funding source similarity on collaboration outcomes
5.	Wong(2011)	Taiwan	Case study of Li & Fung Group	• Relational networks • Supply chain management • Value • Competitive advantages • Internationalization	• Firms with remarkable core competencies are liable to find resource-rich partners for value creation and have the capacity and flexibility to respond rapidly to drastic challenges of global competition. • A global supply chain manager, Li & Fung provides a total value-added package for customers. • Strategic relational networks offer optimal supply chain solutions for customers by its "global virtual production" model and meanwhile acts as "network resources integrator" in the relational networks to configure resources in the global value chain
6	Lowson (2003)	US	Self employed survey	• Dynamic capability • Competencies • Network Relation Performance	• The strategies contain diverse building-blocks initially reflectingvarious resources, capabilities and competencies. However, their composition and subsequent interconnections are also influenced by the exigencies of the market and other supply network forces.

Continue on next page

Table 3.9: Continued

No.	Author/s	Region/ countries	Methodology employed	Variables used	Research findings
7.	TerziovskiI(2010)	Australia	Employs a systematic random sampling procedure from 600 samples of SMEs manufacturing and using the Australian Standards Industrial Classification codes.	• Innovation • Formal Structure • Customer Supplier Relationship • Innovation Culture • Technology Capabilities	• Innovation culture and technological capabilities displayed an significant but negative correlation • Formalization is therefore important for manufacturing SMEs in order to improve their performance. • Limited correlation support exists for customer and supplier relationship • Negative influence of funding source similarity on collaboration outcomes
8.	Anwar , Bambang Subroto , Taher Alhabsji, Djumahir (2014)	Indonesia	Conceptual Study	• Operation strategy • Competitive strategy • Performance	The competitive strategy becomes the instigator of operations strategy based on I/O theory while operations strategy becomes the instigator of competitive strategy based on RBV theory.
9.	Ferreira et al. (2011)	Portuguese	An empirical study was developed based on a stratified sample	• Entrepreneur resources • Firm resources • Networks • Entrepreneurial Orientation (EO)	The research results suggest a set of resources and capabilities that promote the growth of the small firms. The EO seems to have a predictive value on growth. Explaining variables related with resources and capabilities and EO were identified as essential in growth oriented small firms.

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Table 3.9: Continued

No.	Author/s	Region/ countries	Methodology employed	Variables used	Research findings
10	Hong et al. (2010)	USA	Research modeling & Descriptive analysis	• Electronic communication technologies (ECTs) • electronic data interchange (EDI) • supply chain integration • manufacturing competitive capabilities	The results show the importance of applying two specific ECTs (EDI and internet-based) for both supplier and customer integration; and the direct impact of supplier integration and customer integration on manufacturing competitive capabilities.
11.	Rungtusanatham, Salvador, Forza, and Choi (2003)	Global	Literature research	• Supply chain management linkages, • Resources, Operations management, • Performance management	The supply chain linkages framework used to justify decisions to develop, strengthen, and protect relationships with suppliers on the upstream side and with customers on the downstream side. The framework used to evaluate practices implemented to link a firm to its suppliers and customers and to provide a decision roadmap for firms to better understand how to maximize operational performance benefits from these supply chain linkages.
12.	Halldorsson Kotzab, Mikkola and Skjøtt-Larsen (2007)	UK	Theory Perspective study	• Economic, • Socio-economic, • Third-Party Logistics • New product development	The way the four theories complement one another is explored on a conceptual basis. This direction may explore more deeply how these alleged complementarities occur in practice, and how managers mould their decisions by these ideas

3.8.2 Dynamic capability theory

While large arrays of studies have adopted RBV theory to explain the supply chain competitiveness by espoused the importance of resources and capabilities in enhancing competitive advantage, some researchers have questioned the usefulness and applicability of this theory (Ambrosini & Bowman, 2009). They argued that this theory does not fully explain why some firms that have substantial resources and capabilities have failed to refresh and change them in turbulent and volatile environment. Owing to this, the dynamic capability (DC) theory has been established as an extension to RBV theory.

Dynamic capability refers to learned patterns of collective activity and strategic routines through which an organisation could generate and modify operating practices to achieve new configuration (Teece, 2007; Zollo & Winter, 2002). These include strategic decision-making and alliance management which help assure that substantive capabilities could be altered to provide sustainable competitive advantage. This theory facilitates in understanding how supply chain partners could acquire, deploy and reconfigure resources within the organisation and supply chain; and are found to be critical in technology-based environment as it determines the speed of change. The importance of dynamic capability has now been amplified with the increased globalisation. The global economy has become more open, and the sources of invention, innovation and manufacturing are more diverse geographically and organisationally diverse (Teece, 2014). Firms operating on global scale often entail sophisticated dynamic capabilities as they must manage increased business complexity since they have to face with several institutions, cultures, market, demand requirements, political and socio-economic realities, geographies and languages simultaneously.

Numerous studies in internalisation strategy area have adapted this theory (Table 3.10). Some studies have integrated the DC theory with RBV theory in analysing how capabilities could help enhance their firm performance. For instance, Madanmohan, Kumar and Kumar (2004) has adopted both theories to understand the factors that influence technological transfer process among Indian and Indonesian manufacturing firms using survey and interviews methods. A more recent study conducted by Rashid, Jabar, Yahya and Shami (2015) has used both theories to examine how capabilities and resources affect firms' ability to incorporate eco dimension in their product designs. As illustrated by the table, majority of the studies that were conducted focused on the developed countries as compared to the emerging nations. Albino, Dangelico and Pontrandolfo (2012) for instance investigated how collaborations with different actors in supply chain network could enhance environmental performance using the DC theory.

As shown in Table 3.10, the DC theory has received consistent empirical support in various supply chain management literature. For instance, Reuter, Foerstl, Hatman and Blome (2010) have developed a conceptual model of DC theory and adaptive behavior to analyse how sustainability factors could be integrated in the purchase and sourcing function. Their research has proposed stakeholder's pressures, global supplier selection as factors influencing sustainable global performance. Other researches in the area of sustainability that have integrated this theory include Beske (2012) and Gold, Seuring and Beske (2010). The DC theory has also been applied in other supply chain area. For instance, using survey involving logistics firms, Swafford, Ghosh and Murthy (2006) has investigated the impact of procurement, manufacturing and logistics flexibility on supply chain agility while Jin and Edmunds (2015) has developed a conceptual model to investigate the role of relationship and resources in enhancing

supply chain network capabilities and firm performance. Despite these literatures, there are however little studies have been conducted in the area of information technology research involving supply chain network based on the DC theory. Out of 26 studies found in relation to DC theory and supply chain management field, only five of them focused on the information technology issue.

While many organisations have invested heavily in information technology infrastructure in anticipation of significant improvements in information-sharing capabilities and supply chain performance, most have failed to gain the expected benefits (Rodon et al., 2011). Information technology requires partnering firms to develop relationships that facilitate in sharing valuable information; and effective information sharing could create imitable capabilities. While most firms could address their internal factors impediments, inter-organisational factors seem to be more problematic to resolve since multiple firms are engaged in the decision-making process. And this scenario will become more serious if it involves global operations due to the distinct environment. Given these arguments, it is believed that the dynamic capability theory provides a strong basis for studying information sharing in global environments.

Table 3.10: Research Adopting Dynamic Capability Theory

No	Author/s	Year	Samples	Methodology employed	Variables used	Research Findings
1	Reuter et al.	2010	European chemical companies	Case study	• Stakeholders' pressures • Global supplier selection • Sustainable global performance	Integration of DC theory and adaptive significant to the Purchase and Sourcing Management function integrates sustainability in its global supplier management processes.
2.	Swafford et al.	2006	U.S. logistics firms	Survey	• Procurement flexibility • Manufacturing flexibility • Logistics flexibility • Supply chain agility	Positive impact of procurement, manufacturing and logistics flexibility on supply chain agility
3**.**	Fawcett et al.	2011	U.S manufacturing firms	Case study and survey	• Supply chain connectivity capability • Information sharing culture • Operational performance • Company's growth	IT technology could enhance supply chain collaboration based on the RBV and DC theories
4.	Gold et al.	2010	None	Literature review	• Inter-organisational resources • Collaboration • Sustainability • Competitive advantage	Sustainable value inter-organizational resources and sustained inter-firm competitive advantage through collaboration on environmental and social issue, based on the RBV and DC theories

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Table 3.10: Continued

5.	Beske	2012	None	Conceptual	• Orientation • Supply chain continuity • Risk management • Pro-activity • Knowledge • Partners' development • New capabilities • Sustainable performance	The complementarities of DCs and sustainable supply chain develop a framework on measuring long-term and temporal sustainable performance.
6.	Jen and Edmunds	2015	None	Conceptual model	• Configurations • intangible resources • relational resources • accessibility • efficiency • mobility • learning ability • firm performance	The conceptual framework that investigate the relationship of supply chain network resources on supply chain network capabilities and firm performance
7.	Caniato, Caridi and Moretto	2013	Italian fashion manufacturer	In-depth case study	• market domain • business domain • external domain • dynamic capability • organisational innovation • product innovation • supply chain innovation	The conceptual framework identified the main features of supplychain innovation and the role of dynamic capabilities in implementing such innovations in the context of the fashion-luxury industry.

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Table 3.10: Continued

10.	Wang, Lai and Shi	2011	Chinese SMEs	Survey	• IT infrastructure • IT knowledge • System integration • Market responsiveness • Learning • Coordinating • Integrating	IS competence can enhance SMEs dynamic capabilities in a competitive business environment
11	Hanvanich, Sivakumar and Hult	2006		Survey	• Learning orientation • Organisational memory • Technological turbulence • Market turbulence • Overall performance • Innovativeness	The positive moderating roles of environment turbulent on learning orientation and firm performance
12	Rajaguru and Matanda	2013	Australian retailers	Survey	• technology compatibility • strategic compatibility • culture compatibility • supply chain capabilities • inter-organisational information system integration	Positive mediating relationship between inter-organizational information system (IOIS) integration on inter-organizational compatibility and supply chain capabilities
13	Koch	2010	U.S. firms	Case study	• trial-and-error" culture • sales managers' activities • capabilities • entrepreneurial alertness • customer agility	Entrepreneurial alertness and DC are necessary to develop electronic marketplace that generate and sustain participant contributions.

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Table 3.10: Continued

14	Leonidas, Paliwahadana and Theodosiouet	2015	Hotels in Cyprus and Turkey	Survey	• organisational learning • relationship building • shared vision • cross-functional integration • technology sensing • eco-based competitive advantage • global performance	The organizational capabilities and relationship positive towards eco-based competitive advantage and global performance in the hotel industry.
15	Yu et al	2013	Chinese firms	Survey	• strategic orientation • technology oriented • organisational innovativeness	Technology orientation and innovation create organisational innovativeness.
16	Albino et al.	2012	U.S. Firms	Survey	• environmental collaboration • environmental performance	Investigate how collaborations with different actors in supply chain network enhance environmental performance
17	Parente, Baack and Hahn et al	2011	Brazillian firms	Survey	• product modularization • supplier integration • cultural distance • new product development.	The international firms' operations strategies and cultural affect dynamic capability creation and operations management.
18	Osabutey et al.	2013	Ghana construction firms	Structured interviews	• Expertise • Knowledge transfer • Construction technology	The technology and knowledge transfer important in the Ghana construction industry

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Table 3.10: Continued

22.	Madanmohan et al.	2004	Indian and Indonesian manufacturing firms	Survey and interviews	• Technology planning and control • Market orientation • Training and technical personnel • Government support • National technology infrastructure • Technology capability • Economic performance	RBV and DC theories influence technology transfer process among Indian and Indonesian manufacturing firms
23	Rashid et al.	2015	Malaysian automotive industry	Survey	• Technology collaboration • Green human resource • Eco culture • Formal environmental management systems • Top management support	The firms' resources and capabilities contribute to eco product innovation
24.	Kocoglu et al.	2012	None	Conceptual framework	• Learning capability • R & D capability • Manufacturing capability • Technological learning • Performance • Innovativeness	The technological innovation capabilities and technological learning affect firm performance and innovativeness
25	Wang et al.	2013	Taiwan manufacturing and service firms	Survey	• market orientation • IT infrastructure capabilities • Customer relationship management • Dynamic marketing capabilities	The firms' dynamic capabilities (technology) affect critical business function (marketing).

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3.8.3 Social exchange theory (SET)

Another theoretical perspective that can be utilised to analyse the supply chain capability factors that influence global SC competitiveness is social exchange theory (SET), which was developed by Homans (1961) in the field of psychology. SET is a formal theory that focuses on voluntary exchanges of value by actors (people, organisations), who rationally aim to maximize their gains in a social system (Calhoun et al., 2007). The theory argues that the resultant outcome of an organisation's behaviour relies on the actions of other firms within the exchange relationship. According to the theory, relationship and social factors may influence the transaction climate, in which a favourable relationship between a firm and its supply chain partners encourages firm performance.

Reaping the potential benefits of global operations may poses great challenges, since globalisation is forcing local manufacturers to seek suppliers outside country whose cannot only be trusted, but could also help in achieving the objective of buying quality products at lower cost. In a global supply chain buyer-supplier relationships (BSRs) which involve close collaboration in both product and process development (Kari, 2014) are pertinent as this may provide firms with capabilities that mitigate the challenges faces in new markets are conducive to their expansion to these markets (Golgeci & Arslan, 2014). Firms expanding into international market require knowledge to successfully operate and make proper strategic decisions, which include learning about formal and informal requirements and market characteristics. Nevertheless, access to resources and knowledge throughout the chain entails firms to form and manage good relationships with potential partners (Capaldo, 2007). Moreover, as global supply chain results in a greater exposure to various issues including border crossings, multiple

modes of transportation, different government systems, technology and security concerns, a well developed relationship among partners within the chain is paramount important. A well-managed supply chain relationship could reduce the risks and uncertainties in transactions, generating many returns such as lower product and service costs, improved quality, greater levels of innovation and satisfaction in business performance (Golicic, Broyles & Woodruff, 2003). By having close relationships, supply chain partners further are willing to share risks and rewards as well as maintain the networking over a longer period of time.

Social exchange theory has been utilised in supply chain research to examine stability and alliance performance (Yang, Wang, Wong & Lai, 2008), coordination of supply chains (Holweg & Pil, 2008) as well as competitive and cooperative positioning in supply chain logistics relationships (Klein, Rai & Straut, 2007) and role of personal relationship in logistics (Gligor, Holcomb & Stank, 2013). Yang et al. (2008) examine the stability between supply chain members in relation to alliance performance. They focused on benefits and trust. Klein et al. (2007) address the issue of need fulfillment that creates the relationship. Further, they stated that this relationship is mixtures of cooperation and competitiveness that will lead to performance gains. These relationships are exchange linkages between organizations that are supply chain members. Social exchange theory should be relevant to supply chain management (SCM) since a supply chain is by definition is an interrelated network of suppliers and customers. Social exchange theory is also used to examine structures created as a result of activities, such as supply chain driven activities.

In the context of global supply chain, few studies have addressed this issue. Yu, Cheng and Chuang (2013) for instance found that the development of trust and commitment can reinforce the competitive strength in supply chain relationship. In

another study, Anderson (2002) stated that social capital serves as both a product of the entrepreneurial network and an enabler of continued network development, facilitating coordination and co-operation of network ties by bonding the parties. Uzzi and Gillespie (2002) have confirmed that SMEs benefit from good relationships with their supply chain partners, influencing the economic activity. Nevertheless, few empirical studies on *guanxi* (personal connections) and firm performance in China provide inconclusive results. Guanxi, which involves exchanges of social obligation as well as seeking and giving favours, can help firms to secure scare resources and business information. These personal ties also facilitate firms to acquire quality materials, good services and timely delivery (Peng & Luo, 2000). Similarly, Batjargal and Liu (2004) demonstrate that strong personal ties between entrepreneurs and venture capitalist have significant impact on investment delivery time. Nevertheless, Park and Luo (2001) found that while guanxi leads greater sales growth, it has little impact on profit growth.

The Social Exchange Theory has also received attention from studies that investigate the culture issues in strategic alliance context. For instance, using the Malaysian manufacturing firms as samples, Sambasivan and Nget Yen (2010) have adopted this theory to investigate the relationship between organisational culture and strategic alliances. Their study highlighted that organisational culture fit plays a crucial role in the exchange relationships. They found that strategic alliance between supply chain partners with dissimilar cultures can only survive for a short period of time, while aligned and compatible cultures are needed for alliances to survive for a long duration. In another recent study, Damanpour and Aravind (2012) have used the theory to examine how organisational culture differences affect international joint venture performance among Indian firms. Given these considerations and empirical evidence,

Social Exchange Theory (SCT) therefore may provide a useful research view to study global supply chain competitiveness (Table 3.11).

Table 3.11: Research adopting Social Exchange theory

No.	Author/s	Region/ countries	Methodology employed	Variables used	Research findings
1.	Anderson (2002)	Canada	The combination of over 100 matched buyer-supplier dyads with a comprehensive survey of relationship constructs	• Demand planning • Category strategy • Supplier strategy • Buyer-supplier relationship	- The study found that in global supply chain, buyers and suppliers have significantly different perceptions of their relationships across a range of dimensions. - The Social Exchange Theory is applicable for Supply Chain Management and can be a valuable instrument when analyzing buyer-supplier relationships
2.	Uzzi and Gillespie (2002)	USA	Interview	• Network partner • Debt management • Commitment	- Exchange relationships influences economic activity - Focusing purely on network structure, however, may inadequately explain how exchange relationships function by assuming that "a tie is a tie"
3.	Chao et al. (2013)	Taiwan	Self-report Survey	• Relationship tenure • Trust • Commitment • Future Dealing • Communication Perceived benefits	- Both communication and perceived benefits had positive effects on trust. - Trust had a significantly positive effect on the future relationship, whereas the effect of commitment was non-significant.

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Table 3.11: Continued

No.	Author/s	Region/ countries	Methodology employed	Variables used	Research findings
4.	Ambrose, Marshall and Lynch (2010)	Ireland	Survey Questionnaires	• Trust • Commitment • Power • Communication • Uncertainty • Performance	- buyers and suppliers have significantly different perceptions of their relationships across a range of dimensions.
5.	Sierra and McQuitty (2005)	USA	A cross-sectional questionnaire	• Inseparability • Shared responsibility • Emotional response • Service loyalty	- Due to the inseparable nature of the consumption and production of services, there is a natural social exchange between service employees and customers. - Support was found for the predicted relationships between inseparability and shared responsibility, shared responsibility and emotions, and emotions and service loyalty
6.	Holthausen (2013)	Netherlands	Literature review	• demand planning, • category strategy, • supplier strategy • awarding	- The Social Exchange Theory suggests that establishing a long-term relationship through increased trust and commitment, which are major variables within the theory, will outweigh the costs of supplier management. - Hence the SET is a valuable instrument for purchasers in order to improve the buyer-supplier relationship

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Table 3.11: Continued

No.	Author/s	Region/ countries	Methodology employed	Variables used	Research findings
7.	Kari (2014)	Finland	multiple-case analysis from 43 in-depth interviews	• Buyer supplier attractiveness • Value • Perceived trust • Dependence	- The self-awareness of the determinants of attractiveness, use of power-balancing mechanisms, and primacy can explain the exchange asymmetry in buyer-supplier relationships (BSRs). - The study highlights the importance of firms using the power-balancing mechanism in order to gain value from supply chain partners. The results show that firms can use attractiveness strategically to influence supply chain partners.
8.	Sambasivan and Nget Yuen (2010)	Malaysia	Survey questionnaires to 109 manufacturing firms	• Organisational culture • Degree of integration • Alliance outcome	- Alliance firms cannot ignore the influence of organisational culture compatibility on the value creation
9.	Damanpour and Aravind (2010)	India	Survey questionnaires to 202 Indian firms	• Organisational culture differences • Integration acculturation strategy • Interaction process • Satisfaction with international joint ventures	- Cultural differences among partners influence interpretation and responses to strategic and managerial issues, compounding transactional difficulties in IJVs and affecting partners'trust and interaction

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3.9 Factors of Global Supply Chain Capabilities

To success in international business, a global firm should develop specific competences that are relatively unique and incomparable to maximize their capabilities in the international level (Barney, 1991; Nelson, 1991). Based on the three theories discussed, this study highlight that trust (Gulati, 1995), coordination and integration (Simchi-Levi et al., 2003), technology, organisation culture (Parkes et al., 2001) and strategic sourcing (Chopra & Meindl, 2010) are expected to be the factors of global supply chain capabilities. They are discussed below.

3.9.1 Trust

Trust has been studied widely in the social exchange literature (McEvily, Perrone & Zaheer, 2003), economics (Sako & Helper, 1998), marketing (Doney & Cannon, 1997; Morgan & Hunt, 1994), information technology (Vance et al. 2008) and supply chains (Chai, Koh & Tsai, 2010). Researchers from different disciplines have interpreted trust in different ways and dimensions by focusing on specific aspects of trust. In each context, the object of trust differed in that trust is between individuals (Mayer, Davis & Schoorman, 1995), between organisations (Gulati, 1995), individuals and organisations (McEvily et al., 2003), partners' competence (Fullerton, 2010). McEvily et al. (2003) refer trust as a subjective expectation an agent has about another's future behavior based on the history of their encounters. Grandison and Sloman (2000), introduces trust as a firm's belief in the competence of an entity to act dependably, securely, and reliably within a specified context. Meanwhile, Olmedilla, Rana, Mathhews and Nejdl (2005), applies trust as a party A to a party B for a service X is the measurable belief of A in that B behaves dependably for a specified period within a

specified context (in relation to service X). From these definitions researcher concluded trust as expectation of supply chain partners about future behavior in specified context.

Trust between partners can be created by the supply chain partners adapting and customising business operations and providing alternatives to meet the specific needs of the other supply chain partner. According to Coulter and Coulter (2002), collaboration between partners can enable the supply chain members to adapt and customise their supply chain practices, goods and services to fit their partner's business to provide improved performance for the supply chain. In addition, maintaining and building trust between supply chain partners relies on continued commitment to communication together with sharing information and planning (Kwon & Suh, 2004; Myhr & Spekman, 2005).

3.9.2 Logistics coordination and integration

In global business, companies have striven to develop capabilities to deliver the right products, to the right locations, at the right time, at a competitive cost, and with customer satisfaction in order to ensure a competitive advantage. But due to the globalisation of business, the competition has increasingly transformed supply chain coordination from inter-company to inter-supply chain. In this situation, supply chain manager intends to align the decisions and executions more closely between the trading partners (Simchi-Levi et al., 2008). In a highly-globalised market, global manufacturing strategies alone may not be the solution if not supported by successful logistics strategy. A more comprehensive framework for logistics strategy goes beyond the physical movement of products, yet includes cost management and information exchange

throughout the network. In a recent study conducted by Spillane et al. (2013), logistics coordination was found to be an important critical success factors for developed economies. Lack of logistics coordination will create supply chain misalignment and inefficiencies. In a misalignment supply chain, supply chain partners lack of consistent incentives. Different parties in the supply chain often have different incentives for doing business. They will not cooperate with their supply chain partners unless they have an incentive for doing so.

Supply chain incentive misalignment is associated with two common observations in supply chain management. First is the widespread existence of conflicting objectives among the supply chain partners (Fu & Piplani, 2004). For instance, suppliers typically want manufacturers to commit themselves to purchasing large quantities in stable volumes with flexible delivery dates. Unfortunately, manufacturers require just-in-time (JIT) supply in small batches from their suppliers due to changing demand and their unwillingness to hold inventories. Thus, the suppliers' goals are in direct conflict with the manufacturers' desire for inventory holding and flexibility. Second is the lack of shared visions and risks between the supply chain partners (Fu & Piplani, 2004). For example, suppliers, manufacturers, and retailers often optimize their inventory levels according to their own forecast of future demand. They do not share their observation of the shifts in the marketplace. The result is high inventory costs, high response time or poor service levels.

Researchers in supply chain management area have increasingly acknowledged the importance of resource-based view (RBV) to strategic logistics research (Ramsay, 2001; Lai & Wong, 2012; Barney, 2012). This theory underlined majority of the

research conducted in this area by highlighting the significance of heterogeneous supply chain management capabilities in developing and sustaining competitive advantage. Past studies on the logistics coordination involving RBV theory have suggested information technology as a source for competitiveness, in which rare and hard-to-copy IT applications as essential resources for superior supply chain performance (Lai, Chiu, Yang & Pai, 2010; Projogo & Olhager, 2012). Wal-Mart for instance has created a unique logistics management system encompassing company owned transportation fleet and communication network to connect its stores, for achieving these seemingly contradictory objectives. The company shares its point of sales data with suppliers through its proprietary information system called Retail Line and low pipeline inventories through cross docking distribution centers which ensure that inventory is always kept in motion. Wal-Mart significantly has higher dollar sales per square foot, market-share, growth, and profitability as compared to its competitors.

3.9.3 Technology and Supplier management

Generally supplier management refers to practices that promote closer involvement with fewer selected suppliers by establishing long-term relationships, information sharing systems and better coordination (Chen & Paulraj, 2004). Previous researcher found that supplier management directly and positively affects the company's sustainability performance. By sharing information and improving coordination with suppliers, for instance, companies can optimise their inbound transportation flows and reduce the generation of by-products e.g. packaging, and managing waste (Plambeck, 2008). Similarly, by guiding suppliers to improve manufacturing capabilities, the buyer reduces its own waste significantly.Supplier

management facilitates closer cooperation with fewer upstream partners and allows the sharing of key resources, technologies, risks and rewards. However, global sourcing implies the difficulty in managing economic, financial, information and material flows across wider spatial horizons, greater exposure to environmental factors and risks of all types and cultural and linguistic differences (Nassimbeni, 2006). The effect of global sourcing may occur both directly on the relationship between supplier management and sustainable.

3.9.4 Organisation culture

The significance of inter-organisational cultural fit on supply chain performance is recognised in the supply chain management literature lately (Rajaguru & Matanda, 2013; Thakkar, Kanda & Deshmuk, 2008). However, few empirical studies focus on the influence of inter-organisational cultural fit on supply chain performance. Organisational cultural fit is reported as being best measured at the practices level with national culture measured at the values level (Naor, Linderman & Schroeder, 2010; Cadden, Marshall & Cao, 2013). The majority of previous studies have tended to focus the investigation of cultural fit in differing contexts, such as individual corporations or national cultures (Kale & Barnes, 1992; Parkes, 2001; Veiga, Lubatkin, Calori & Very, 2000), and mainly focus on joint ventures or mergers and acquisitions (Teerikangas & Very, 2006).

Although the importance of organisational cultural fit in supply chain relationships has been reported in the literature as significant (Barringer & Harrison, 2000; Cousins & Menguc, 2006; Fawcett, Magnan & McCarter, 2008; Lamming,

Caldwell & Harrison, 2013), there are little empirical research has been done. For instance, Barringer and Harrison (2000), focused on a theoretical overview of many types of inter-organisational relationships and reported, in general, that all inter-organisational relationships are difficult to manage due to the absence of aligned corporate cultures.

3.9.5 Strategic Sourcing

There are several studies on different sourcing strategies within different sectors, and their application in different contexts. Carr and Pearson (1999) defined strategic sourcing as the recognition of the strategic role of suppliers as a source of competitive advantage, and thus the need of an effective configuration of the supply base. Narasimhan et al. (2006), while approving this notion, further note that strategic sourcing surpasses the traditional view of merely cost minimization and also includes aspects such as quality, service, delivery, responsiveness, and innovation. Strategic sourcing is a concept developed in sourcing literature focusing on the effective configuration of the supply base with motives more than just cost minimization, including aspects such as quality, service, delivery, responsiveness, and innovation (Narasimhan et al., 2006). Lang, Dickinson and Buchal (2002) summarise strategic sourcing as a combination of supplier selection, supplier evaluation, and supplier development.

The strategic sourcing deals mostly with building long-term relationships with the selected few. This requires a strategic segmentation of the selected suppliers, setting the level of relationship in need for each supplier group, and identifying the required

criteria in need of development. Sourcing activities includes analysing expenses, identifying potential suppliers, requesting quotations, negotiating contracts, monitoring and improving suppliers (Kumar et al., 2003). Strategic sourcing aims at identifying and selecting suppliers for long-term partnerships, engages in early involvement of suppliers and supplier development by effectively allocating resources to enhance supplier performance. Therefore, strategic sourcing is increasingly seen to be business capabilities of firms. It provides benchmarks and continuous feedback to suppliers and in some cases engages in supplier pruning activities (Hult, 1998; Talluri and Narasimhan, 2004).

Sourcing if properly structured can effectively combine the core competencies of a given firm with the skills and capabilities of its suppliers. Sourcing decisions are vital for any organisations that want to leverage on its core competencies and outsource other activities in order to gain and retain competitiveness. According to McGinnis and Vallopra (1999), the capabilities that facilitate the balanced sourcing are modeling total supply chain costs, crafting effective sourcing strategies, building sustainable relationships, integrating the supply web, leveraging supplier integration, and evolving a global supply chain management.

3.10 Conclusion

The literature reviewed leads to some major conclusions. First, from a theoretical perspective, our knowledge on the issues relating to information sharing in the context of global supply chain from the perspective emerging economy is limited. The majority of research in this field are conducted in developed nations, such as in the U.S. and UK,

Singapore, Turkey as shown in study by Masson et al. (2007), Hesse and Rodrigue (2006), Mason-Jones and Towill (2000), Fawcett et al. (2009), Hong et al. (2010), and Elwan Ibrahim et al. (2011). Despite the importance of these studies, it is doubtful whether such findings can be adopted to explain the same issue in other international environment, which have unique economy, culture and behaviour. Manufacturing firms from emerging economies such as Malaysia are confronted with distinct issues which include lack of logistics infrastructure, restricted technology-skilled labour resources and low level of supply chain management practice such as quality management, Just-In-Time (JIT) strategy and integrated information technology along with diverse consumer purchasing patterns which may prevent substantial development of the industry. Local manufacturing industry need to develop effective management practice in order to be competitive in the global arena. The establishment of ASEAN China Free Trade Area which came into effect on 1 January 2010 creates more competition, issues and challenges for the local manufacturing firms in the region. These firms are often suppliers of products or services to larger firms, highlighting the need for them to be pro-active and be able to compete in today's highly competitive environment. While Asian firms are argued to have comparative advantage over Western organisations in the formation and management of alliances and networks (Hitt, 2002), few empirical studies have been conducted to investigate whether the effect of this element on global supply chain competitiveness may vary different cultural context. Further, with much manufacturing outsourced from emerging economies, addressing this issue from the perspective of this nation is in need.

There is growing recognitions of the potentials offered factors such as logistics capabilities and business networks in managing global supply chains. Nevertheless,

there are inconsistencies observed in the literature, where some studies demonstrate that such business strategies does not positively lead to a firm's supply chain competitiveness (Park & Luo, 2001; Yusuf et al., 2004; Narasimhan & Kim, 2002), largely owing to the research designs employed. The conflicting result suggests the existing of mediator. Some scholars argue (Morash, 2001; Rai & Seth, 2006; Wu et al., 2006) that future research should ascertain the mediating role of value-enhancing exchange processes inthe relationship between these factors and firms' competitiveness. They argue that information sharing between firms could be one such mediator that translates the benefits of some factors such as having good business networks and logistics capabilities into concrete firms' supply chain capabilities. Greater information sharing is associated with effective supply chain management practice as it enables efficient flow of materials; improve coordination, traceability and responsiveness, reducing transaction costs between supply chain partners. Given these, further research exploring the effect of information sharing may help build a deeper understanding of this issue.

Within the information sharing and supply chain literature, there is relatively little attention paid in linking the factors that instigate firms to embrace information sharing and the implications for global supply chain competitiveness. Moreover, many of these studies rely on anecdotes and case studies, with few empirical works to measure such initiatives and their impact on firms' supply chain competitiveness. Moreover, these studies focused on only one theory, which may lead to an overestimation of the impact of some factors (Hair *et al.* 1998). Similarly, having a unified research framework may contribute to improved theory development with greater explanatory power (Kuhn, 1970). Information technology (IT) deployment, as

part of a firm's resources alone for instance may not contribute to the resource-based view. As information technology (IT) has relatively low barriers to imitation and acquisition by other organisations, the benefits associated with the technology may diminish quickly. Many scholars have argued that IT resources need to be embedded in supply chain processes, so as to facilitate the development of higher order organisational capabilities such as supply chain competitiveness (Wu et al., 2006). While the practice of information sharing may involves huge capitals as organisations need to reengineer their business process to ensure the systems compatibility, investment in such practice may assists firms in developing new resources and capabilities. For instance, by sharing information, firms may be able to speed up the process of new product development. Reorganisation of production process for information sharing practice may create opportunities for firms to achieve better coordination and reduce transaction costs between supply chain partners. These arguments highlight the need for a future study to incorporate other theoretical basis with RBV theory.

Despite the abundant theories, concepts and practices of information sharing in global supply chains available in the literature, this issue still remains inconclusive due to the theoretical and methodological aspects identified in the literature. This study therefore, addresses the gaps identified earlier which include lack of empirical findings in the context of developing economy involving local businesses, little studies positioning information sharing as mediator and limited theoretical perspectives which may limit our understanding of such issue. In order to help bridge these knowledge gaps, Chapter 4 presents a conceptual framework for evaluating the role of information sharing as mediator in global supply chain competitiveness from the perspective of local

emerging economy manufacturing firms by bringing together existing literature in support of the framework.

CHAPTER 4: THEORETICAL FRAMEWORK AND HYPOTHESES TESTING

4.1 Introduction

The previous chapter has illustrated the pertinence role of information sharing in achieving global supply chain competitiveness. Several underpinning theoretical perspectives that could explain global supply chain competitiveness are also discussed. Nevertheless, restricted methodological and theoretical approaches make it doubtful whether such illustration could be generalised to Malaysian local firms engaging in international markets, providing impetus for this study. Following the reviewed literature and knowledge gaps identified in Chapter 3, this chapter presents a detailed development of conceptual model and associated hypotheses with the aim to interpret how the global supply chain capabilities would lead to global supply chain competitiveness; and therole of information sharing as mediator in attaining global supply chain competitiveness in the context of Malaysian manufacturing industry.

4.2 Conceptual framework

Figure 4.1 illustrated the higher level of conceptual framework for this research. The framework identifies that the supply chain capability factors will have an impact on global supply chain competitiveness; and this relationship is mediated by information sharing.

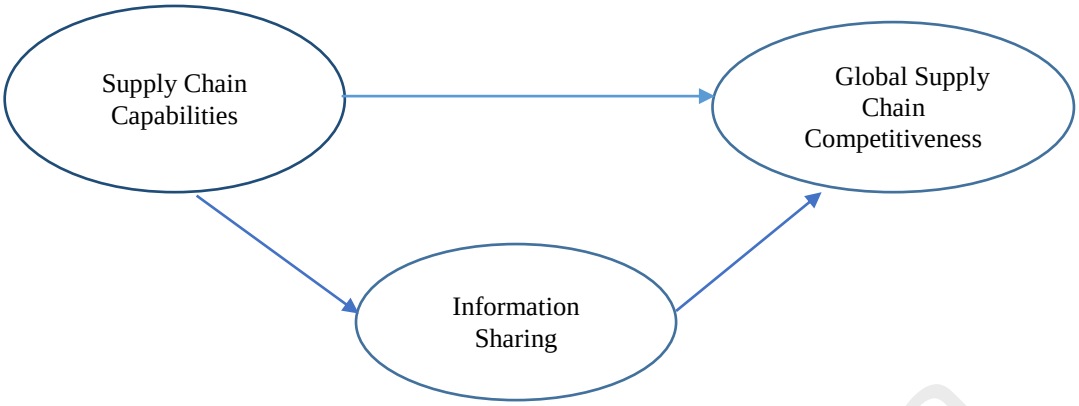

Figure 4.1: Higher level of conceptual framework

The higher level of conceptual framework is expanded to the detailed conceptual framework as highlighted in Figure 4.2. As highlighted in Figure 4.2, five supply chain capabilities drivers which include organisational culture fit, technology compatibility, trust, logistics coordination and strategic sourcing that could determine organisations decisions to share information and reap global supply chain competitiveness. Secondly, the model also asserts that information sharing mediate the relationship between these factors and a firm's global supply chain competitiveness.

The research framework is grounded in three well-established theories - Resource based view, Dynamic Capability Theory, and Social Exchange Theory. While the first and second theories focus on the assets and capabilities of companies that allow them to respond to external opportunities and threats, Social Exchange Theory stems from relational perspective.

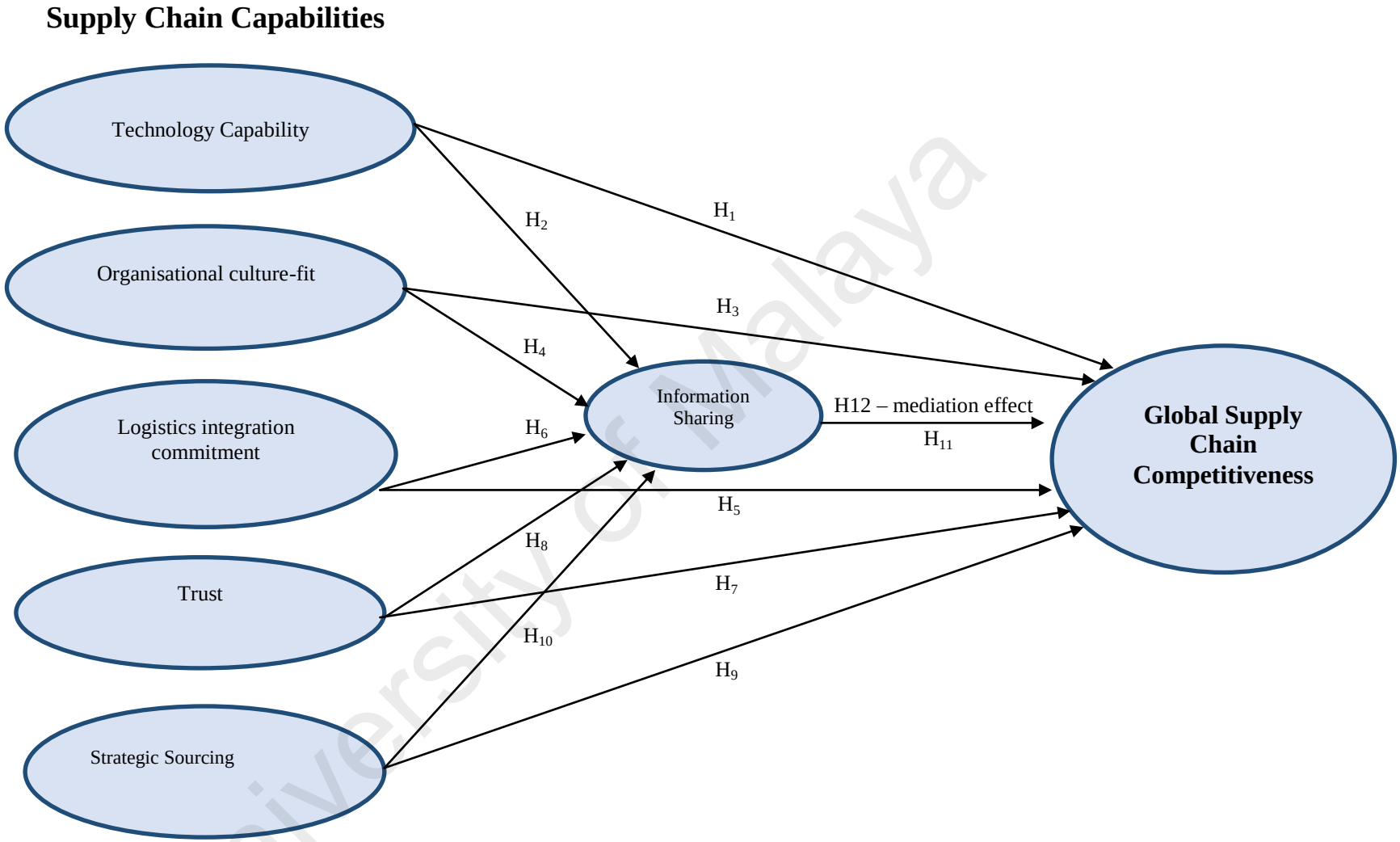

Figure 4.2: Research Framework

As discuss in chapter 3, the Resource based view (RBV) asserts that an organisation's sustainable competitiveness rely on the company's ability to control the valuable, rare, heterogeneous and imitable resources and capabilities. Based on this argument, the conceptual model incorporates technology capability which captures the availability of relevant IT infrastructure, employees that have adequate IT skills and compatibility of IT infrastructure between firms and partnering organisations. As globalisation proceeds and information technology developed, the value and ability to link supply chain partners across the globe becomes more apparent (Mefford, 2006). The application of IT in supply chains are seen as a tool that make information sharing along the supply chain possible and critical to company's successful operations. This is particularly important in global supply chains, in whichfirms around the world are increasingly sourcing materials and marketing their products in international markets. Yet, unlike the developed countries' firms, organisations that emerge from developing nations may face challenges in maintaining their competitive advantage as they may face problems in applying advanced information technology due to lack of technological resources (Lyytinen, 2001). Moreover, within supply chains, there is a need for effective and efficient product transactions and information sharing among partnering firms (Knapp et al., 2006). Yet, differences in supply chain partners' information technology infrastructure may affect the information sharing process. This issue becomes more critical in global environment as firms from different countries may have different technological standards; and different actors within the supply chain network may have divergent interests, which may influence the standardization process to some extent. For instance, in radio frequency identification (RFID) technology environment, there exist two major standards – ISO and EPCglobal. While ISO adopts a cross industry perspective with a generic approach, the EPCglobal is driven by large-end users. Hence, this variable is argued

to be important in determining the information sharing and global supply chain competitiveness.

On the basis of Dynamic Capability Theory, which highlights how supply chain partners could acquire, deploy and reconfigure resources within the organisations and supply chain (Newbert, 2007), this study integratesthree constructs including logistics integration commitment strategic sourcing and information sharing. Logistics integration commitment refers to the continuity or long-term orientation with both parties- suppliers and buyers cooperating to maintain the coordination of logistics function (Ginnis, Kostas, Politis & Kaklis, 2010). It refers to the support given and active involvement of supply chain partners in enhancing the strategic importance of logistics management. The increasing global competition has driven firms not to only focus on their internal operations, yet also consider integrating their supply chain partners into the overall process of value chain. The supplierscommitted in delivering value to the buying firms help building competitive capabilities. The commitment of firms in putting large investments in building their logistics integration capabilities may lead to seamless connection between suppliers and buyers and greater strategic information flows. The second element, strategic sourcing refers to the process of designing and managing supply networks in line with operational and organisational performance (Narasimhan et al., 2006). The ways firms source from suppliers have changed considerably. Given that manufacturing firms are getting more focused on their core competency, their reliance on strategic suppliers increase. Rather than keeping a large base of suppliers and low price materials, firms are now integrating suppliers into their firm's operations, leading to various collaboration practices. In a global environment, strategic sourcing has

gradually become a significant component of companies' global strategies to achieve various strategic goals (Sambasivan & Nget Yuen, 2010).

From the perspective of Social Exchange Theory, the conceptual model incorporates trust and organisational culture fit. Trust is defined as expectations that reduce the fear that one's exchange partner will act opportunistically (Bradach & Eccles, 1989). A vigorous technological infrastructure alone does not assure significant supply chain capabilities. Successful supply chain management also depends on strong collaborative ties and willingness of firms to exchange information in sharing information, which is built upon trust (Soosay, Hyland & Ferrer, 2008). Furthermore, local manufacturing firms in emerging economies often depend on their larger supply chain partners for business survival. These large companies commonly possess advanced information technology infrastructure and often coerce their suppliers to exchange information. As the costs of establishing an IT infrastructure are significant, firms in the developing countries often depends largely on their bigger counterparts to foster and sustain technological innovation activities. Moreover, in these nations, SMEs are the backbone of the national economy and they have a limited capacity to commence R & D activities internally. Favourable network ties between supply chain partners could facilitate firms in emerging economies to enhance supply chain capabilities. The second construct, organisational culture fit refers to the degree which the needs, demands, goals, objectives or structure of a firm are consistent with the needs, demands, goals, objectives or structure of the company's supply chain partners (Rajaguru & Matinda, 2013). Differing cultures and strategic goals of partnering firms may impede the information exchange process and supply chain performance (Rai et al., 2006). Moreover, supply chain complexity

issues may also emerge if supply chain partners' strategic goals are diverged. Table 4.1 represents the summary of theory and global supply chain capability factors.

Table 4.1: Theory Used and Relations to Supply Chain Capability Factors

Theory	**Global Supply chain capability factors**
Resource-Based View (RBV)	Technology capability (Madanmohan et al., 2004) Information sharing (Rodon et al, 2010)
Dynamic Capability theory (DC)	Logistics integration commitment (Sum et al., 2001) Strategic sourcing (Williamson, 1975; Yigitbasioglu, 2010)
Social Exchange Theory (SET)	Trust (Yang et al., 2008) Organisational Culture (Sambasivan & Ching, 2010)

4.3 Hypotheses development

Based on the conceptual model developed and literature reviewed, twelve hypotheses are articulated to describe the links between driving forces behind organisations' decision to pursue information sharing and the impact of such strategy on a firm's supply chain capabilities. The following sections outline the hypotheses developed.

4.3.1 Supply Chain Capability Factors and Global Supply Chain Competitiveness

While a good IT infrastructure could be assumed as common in most firms in developed countries, such assumption may not be applied in some developing countries' firms (Greengard, 2010). In emerging nations, there may be shortage of computer equipment and software to deploy electronic linkages between firms along the chain, which in turn would make information sharing a daunting task. The installation of computer technologies also requires firms to provide relevant IT training to upskill the employees. The constraint may force selection of suppliers or

establishment of facilities in more developed countries, or at least major cities of developing countries. This choice may not be optimal either for the firm or the country, making them lesser competitive.

Without compatible technology, firms may have to limit the application to a few transactions or maintain both electronic and manual systems. Despite the advances in information technology, compatibility of technological standards still inhibits the development of communication link between firms in a supply chain. As firms extends information sharing across supply chains, partnering organisations' technology (e.g. software, hardware, networking systems) need to be seamlessly compatible to achieve superior supply chain competitiveness (Siau & Tian, 2004). Without compatible systems, firms are likely to build island of automation, limiting the scope and scale of the information exchange capabilities and organisational impact. Firms that have broader information capabilities are able to support more of their value chains and coordinate business processes including purchasing, manufacturing and logistics, leading to lower inventory, transportation costs, hence improving overall supply chain capabilities. Based on these arguments, this study therefore postulates that:

H_1 Technology capability is positively related to firms' global supply chain competitiveness.

Attention to culture in the international business environment is critical to the entry and sustainability of firms in the global marketplace. Virtually every structure, function, and operation of any successful international business is influenced by its own home culture and the culture of its host country. Cultural differences and incompatible value systems have been identified as a key factor causing integration

failures, resulting from inability to understand and adapt to forward ways of thinking and acting (Ferraro, 1998, Rajaguru & Matanda, 2013). People are probably quick to see irreconcilable differences and when they do, relationships breakdown despite potential economic gains (Friedman, 2002). Moreover, as cultural compatibility promotes effective communication and knowledge exchange that inculcate shared goals, partnering firms require compatible cultures to attain a sustainable competitive advantage. Building on these arguments, this study postulates that:

H_3 Organisational culture-fit is positively related to firms' global supply chain competitiveness.

Logistics integration commitment would also drive firms to improve their global supply chain competitiveness. Given that international operations are associated with larger geographical distance, firms may face higher degree of uncertainties, leading to long lead time and inaccurate demand forecasting, logistics integration which require a good (Gereffi & Lee, 2012). Such integration produces a seamless connection between firms and suppliers, and would facilitate firms in reducing various problems including bullwhip effect (Olhager & Projogo, 2012). Coordinated logistics function also permit firms to adopt lean production system which are associated with reliable order cycles and inventory costs reduction. Following this trait, this study postulates that:

H_5 Logistics integration commitment is positively related to firms' global supply chain competitiveness.

As the local manufacturing companies are increasingly sourcing materials and marketing their products in overseas market, they increase their reliance on strategic supplier relationship as this appears to be a potential antecedent to improve

performance. A long term relationship based on trust may engenders confidence in both parties to participate in various collaboration practices including joint improvement programmes, early supplier integration in product design, as well as risks and profit sharing (Prajogo & Olhager, 2012). This could leads to increased know-how information exchange which could benefits the companies. Trust could also extend the longevity of strategic relationships encouraging both parties to invest more in building the relationship. Moreover, internally driven supply chain practices such as postponement, Just-In-Time and lean manufacturing need to be incorporated with relational capabilities such as trust element. Some studies have found that supplier collaboration built on trust has a direct effect on firm performance (Chen & Paulraj, 2004; Singh & Power, 2009).Therefore, this study hypothesizes that:

H_7 Trust is positively related to firms' global supply chain competitiveness.

Various strategic sourcing practices have been shown to enhance financial performance (Carr & Pearson, 1999), business performance (Gonzalez-Benito, 2007) and supply chain performance (Paulraj & Chen, 2007). Strategic sourcing enables the purchasing functio to work closely and collaboratively with selected suppliers in various planning processes. Similarly, through strategic purchasing, manufacturing firms are able to communicate demand changes quickly, enabling suppliers to understand and meet the changing requirements in earlier stage (Chiang et al., 2010). Notwithstanding these, strategic sourcing could also help firms in tapping and gaining access into suppliers' capabilities to design and develop major components and finished products. This advantage would benefits the local firms as they are commonly lack of individual resources and capabilities to address innovation challenges and satisfy the needs of diverse global customers (Mesquita & Lazzarini, 2010). Based on these arguments, this study postulates that:

H_9 Strategic sourcing is positively related to firms' global supply chain competitiveness.

4.3.2 Supply Chain Capabilities, Information Sharing and Global Supply Chain Competitiveness

Since the costs of establishing a reliable technology infrastructure are enormous, firms in this region are expected to face challenges, as they notably have a limited ability to provide resources internally. This constraint has limited the information sharing practice in local firms in developing countries. Within supply chains, there is a need for effective information exchange between partners, requiring firms to integrate information technology across the network (Dwyer et al., 1987). Similarly, organisations entering into alliances may find that maintaining and achieving information exchange is difficult if partners have different technical and technological systems (Rajaguru & Matinda, 2013). Expanding connectivity to multiple partners involving multiple transactions beyond shipping orders or invoices requiring variety of software, networking protocols would create incongruence and retards the development of inter-organisational network and information exchange (Attaran, 2004). Based on these arguments, this study postulates that:

H_2 Technology capability is positively related to information sharing between supply chain partners

While technology capability is pertinent in ensuring greater information exchange, various literature have highlighted that this element does not necessarily guarantee willingness of partners in sharing strategic information (Sarkar, Echambadi, Cavusgill & Aulakh, 2001; Tippins & Sohi, 2003; Sambasivan & Nguet

Yen, 2010). Differences in supply chain partners' norms, values, culture and business practice could have a negative effect on business process and resource integration (Jarrat & O'Neill, 2002). Compatibility in supply chain partners' goals and objectives encourages sharing of sales, demand and strategic information, leading to greater collaborative, forecasting and planning activities across the supply chain (Kim et al., 2006). Therefore, information exchange is more likely to occur when business practices, goals, objectives, strategies and culture of supply chain partners are compatible. Building on these arguments, this study postulates that:

H_4 Organisational culture-fit is positively related to information sharing between supply chain partners.

Logistics integration commitment could serve as another factor to influence organisations' decisions to share the information with supply chain partners. In a global environment, logistics integration is pertinent as it provides firms, capability to ensure the necessary quantities of goods are delivered at the right time and place (Prajogo & Olhager, 2012). Nevertheless, the cost and difficulties in coordinating the logistics function might be overwhelming at times, eroding the comparative advantage of a network, encouraging firms to invest in information sharing practice as an effort to facilitate them in coordinating the global supply chain network (Prasad & Sounderpandian, 2003). In light of this, firms that are committed in enhancing their logistics function would view information exchange practice as strategically important to their business. The use of advanced technology such as RFID for instance appears to have a huge potential in coordinating the logistics function (Mingxiu, Chunchang & Minggen, 2012). This technology which could enable firms to track and trace the movement of materials automatically allows them to determine

the location and history of products, without the need to do manual tracking. Following these arguments, this study postulates that:

H_6 Logistics integration commitment is positively related to information sharing between supply chain partners.

Social exchange theory suggests that relational norms such as trust promote information sharing. While the information sharing practice is argued to facilitate firms in reducing the bullwhip effect and firms' internal risk as they could optimise inventory, production and capacity planning, it could also lead to increased transaction risks due to higher levels of transparency. Trust in this respect, could alleviates the fear that a supply chain partner will act opportunistically, rendering a safe environment that encourage more open and honest sharing of information (McEvily, Perrone & Zaheer, 2003; Soosay et al., 2008; Yigitbasioglu, 2010). Trust nurtures the development of long-term relationships and reduces the need to establish governance mechanism such as business contracts (Chengalur-Smith, Duchessi & Gil-Garcia, 2012). For instance, in a collaborative arrangement such as CPFR, trust appears to play a pertinent role as it provides confidence in both suppliers and retailers that the share forecasted data is accurate (Crum & Palmatier, 2004). Therefore, this study hypothesizes that:

H_8 Trust is positively related to information sharing between supply chain partners.

The current business environment which is defined by intense the global competition, increasingly demanding customers and shortened product life cycles have lead increasing attention in strategic sourcing practice. Such practice is seen as one of the important purchasing exercise for the future (Chiang, Kacabasoglu-Hillmer

& Suresh, 2010). Within this contact, firms now build a long-term relationship with suppliers rather than short-term contract, with the numbers of suppliers are kept to few rather than large base. The relationship now has also been enhanced into strategic level, where suppliers are now considered as the integral part of the firm's operation. This change has perhaps led to various avenues of collaboration, in which firms are ready to make large investments in building the relationship including information technology and information sharing (Paulraj, Lado & Chen, 2008). Collaboration between suppliers, customers and focal firms in designing new products for instance, require firms to communicate and exchange information frequently with supply chain partners to capture pertinent upstream and downstream issues relating to product and process designs, thereby reducing the costs of process change in later stage. In a vendor-managed inventory environment, the practice of sharing sales and inventory information between retailers and manufacturers on a real-time basis is pertinent to facilitate suppliers in monitoring the inventory levels and make appropriate replenishment decisions. Based on these arguments, this study postulates that:

> *H_{10} Strategic sourcing is positively related to information sharing between supply chain partners.*

While the technical capabilities are pertinent in achieving supply chain performance, the frequency, quantity and quality of information that is shared really matters (Fawcett et al., 2007). Large investment in technology could fail to produce expected benefits if it is not supported by willingness to share information. By sharing real-time data such as inventory levels, delivery status and production planning and scheduling, firms are able to manage and control their supply chain activities. As such, the problems in coordinating global supply chain activities which are often hindered by time and distance could be reduced. For instance, in a food

industry, information gathered from supermarkets' electronic point-of-sales system permit food retailers, manufacturers and packaging companies to collaboratively develop new knowledge on consumer purchasing behaviours, facilitating the new product development process (Cox & Mowatt, 2004). Similarly, information sharing has also driven the successful implementation of vendor-managed inventory programs, in which it facilitates the replenishment activities, and has been shown to reduce the bullwhip effect.Based on these arguments, this study postulates that:

> *H_{11} Information sharing is positively related to firms' global supply chain competitiveness.*

In line with the Dynamic Capability Theory, which highlights the need for supply chain partners to be able to reconfigure resources within organisations and business network, the expected benefits of technological advances could be retarded without the willingness of firms to exchange strategic information as well as transactional data such as materials or product order (Fawcett et al., 2007). Similarly, few researchers have relate trust, organisational culture-fit and logistics integration to information sharing, which in turn, creates value in the exchange relationships (Yisitbioglu, 2010; Olhager & Projogo, 2012; Wu et al., 2006). These arguments point to the possibility that information sharing may mediate the relationship between the global supply chain capability factors and global supply chain competitiveness. Likewise, while the development of strategic sourcing practice could enhance supply chain capabilities, information sharing plays a role in which it allows suppliers to work with more complete information, and improve their responsiveness. This study, therefore, view information sharing as mediator between different factors identified to contribute towards firms' global supply chain competitiveness. A pertinent rationale for firms to engage in business network is to share information and other resources as

the problem of information deficiency is commonly considered to be an impediment to the enhancement of supply chain capabilities. Hence this study postulates that:

> *H_{12} Information sharing mediates the relationship between the supply chain capability factors (technology capability, organisational culture-fit, trusts, logistics integration commitment and strategic sourcing) and firms' global supply chain competitiveness.*

4.4 Conclusion

This chapter details the theoretical background of the study. Based on four divergent theories - Resource Based View, Dynamic Capability Theory, and Social Exchange Theory this research develops a model of global supply chain competitiveness and information sharing. This model posits that technology capability, organisational culture-fit, trust, logistics integration commitment and strategic sourcing to affect information sharing and global supply chain competitiveness. The model further contends that greater information sharing between supply chain partners may lead to higher firms' global supply chain competitiveness. In order to predict the model developed, twelve hypotheses linking the motivations behind a firm's commitment towards information sharing and the performance outcomes are formulated and discussed. The following chapter details the operationalisation of constructs formed and the methodology adopted in this study in examining the conceptual model and hypotheses developed.

CHAPTER 5: RESEARCH METHODOLGY

5.1 Introduction

This research develops a cohesive framework associated with numbers of hypotheses, drawing from few theoretical perspectives to determine the various factors that may influence the global supply chain competitiveness of Malaysian manufacturing firms and the role of information sharing. A quantitative research method utilising a survey questionnaire was employed to examine hypotheses identified in the conceptual framework. This chapter first identifies the operational terms and measurement considerations involved. A discussion on research design issues covering population, sampling and data collection technique is then presented. Following this, the chapter illustrates the statistical methods used for data analysis in this study.

5.2 Operationalisation of constructs

This section reviews how each variable tested in this study was measured. Most of them are measures developed from various literature discussed in the earlier chapter. In an effort to reduce the measurement bias, this study used multiple item measures to assess the research construct (Podsakoff, MacKenzie, Lee & Podsakoff, 2003).

5.2.1 Independent variables

The independent variables were measured using 24 items grouped into five constructs - technology capability, organisational culture-fit, logistics integration commitment and trust. The following table highlights the measures used to assess the variables identified.

Table 5.1: Independent variables

Constructs	Measure	Supporting previous literature
Technology capability	My organisation uses the most advanced IT systems	Wu et al. (2006)
	My organisation has skilled and knowledgeable IT staff	
	My organisation is experienced in deploying IT applications	
	Our supply chain partners' information systems are technically compatible with those of our firm.	
	There are direct computer-to-computer links with my key supply chain partners	
	Inter-organisational coordination is achieved using electronic links	
Organisational culture-fit	In dealing with different culture, we have shared a similar corporate culture and management style	Sambasivan and Nget Yuen (2010)
	Our organisation considers specific cultural aspects for both supply chain partners and other entities within the market	
	The organisational values and social norms between our firms and supply chain partners are congruent	
	Managers from our firm and those of our supply chain partners exhibit compatible philosophies in business dealings	Rajaguru and Matanda (2013)
	Our firm's procedures are compatible with supply chain partners' business procedures	
Trust	Our supply chain partners never act opportunistically	Skjoett-Larsen (2007)
	We are not worry that our supply chain partners will take advantage of us	
	We believe that our suppliers are honest in business dealings.	
	We are confident our supply chain partners respect the confidentiality of the information they received from us.	

Logistics integration commitment	Logistics integration has a key role in our supply chain from the providing raw material to the end delivery.	Romano (2003)
	We have seamless integration of logistics activities with our key supply chain partners	
	The inbound and outbound distribution of goods with our supply chain partners is well integrated	
	Inter-organisational logistics activities are closely coordinated	
Strategic Sourcing	We heavily source components and semi-processed products across national boundaries	Chiang (2012)
	We gain access to our suppliers' capabilities to design and develop major components and finished products	
	Technical engineering activities are the main characteristic for supplier involvement in this organization.	
	We are well informed about our supplier's product and market	
	We depend on supplier's knowledge and expertise in developing new product	

5.2.2 Dependent variables

The dependent variables were measured using 9 items to assess a firm's global supply chain competitiveness. The following table indicates the measures utilised to examine the variable identified.

Table 5.2: Constructs and measures for dependent variables

Constructs	**Measures**	**Supporting Literature**
Global supply chain competitiveness	Compared to our competitors, our supply chain is capable to provide low cost distribution. Compared to our competitors, our supply chain is capable to provide effective intensive distribution coverage. Compared to our competitors, our supply chain is capable to effectively target selective distribution outlets. Compared to our competitors, our supply chain is capable to assessing information network for both global and local marketplace. Compared to our competitors, our supply chain is capabe to provide good workers and planning responsibility.	Bhatnagar and Sohal (2005)

	Compared to our competitors, our supply chain is capable to use advanced technology. Compared to our competitors, our supply chain is capable to use JIT strategy. Compared to our competitors, our supply chain is capable to increase production capacity. Compared to our competitors, our supply chain is capable to share the information	

5.2.3 Mediating variable

This study also incorporated information sharing as a mediating variable.

Table 5.3: Constructs and measures for mediating variables

Constructs	Measures	Supporting Literature
Information sharing	Our organisation exchange and share the information related to changes in the end-users need, preference, and behaviour. Our organisation exchange and share the information related to changes in the technology of the focal products. Our organisation exchange and share the information within the network as soon as unexpected problem arise.	Chen & Paulraj (2004)
	Our organisation exchange and share the information in the organisations' strategies and policies with network partner. Our organisation exchange and share the information of financial performance and organization know-how within network partner. Our organisation established network information in due to distribute sales information within network partner. Our organisation used information sharing with suppliers and buyers via Extranet.	Fawcett et al. (2007)

5.3 Research design

This study employed questionnaire survey and cross-sectional data to examine the research framework and hypotheses developed. This technique is considered to be a practical approach in providing data that are used to establish a basis for wider generalisation (Zikmund, Babin, Carr & Griffin, 2008). Moreover, this method could ease the administration and data interpretation process facilitate in obtaining reliable data and reducing the variability in the results (Phellas & Seale, 2011; Popper 2004). In the area of supply chain management study, this approach continues to represent 30 to 60 per cent of preferred choice and is considered to be a pertinent method (Kotzab 2005; Mentzer & Kahn 1995). The following section reviews the elements of research design employed in this study.

5.3.1 Unit of analysis and key informants

The unit of analysis used in this research is organisation. The questionnaire was forwarded to the key person in an organisation. The key person was identified and selected based on their roles, which make them knowledgeable regarding the issues studied. Hence, this study targeted a person within a firm who is actively involved in the decision-making process relating to the international operations. By targeting these individuals, the reliability of the collected information could be assured as the respondents respond to questions within their domain of responsibility. They were identified during the initial contact with the sampling organisations. This study selected senior executives or managers as the key informants for large firms and owners or CEO's for the small firms approached. While prior studies suggested multiple respondents per firm to reduce the common method bias (Pinsonneault & Kraemer,

1993; Podsakoffet al., 2003), this approach is not practical to be used in this study, as majority of the samples are categorised as small and medium sized enterprise (SME), where a single informant was the only option (Pennings, 1973). Despite this, the single key informant is argued to be appropriate if most of the respondents are senior executives or owners of the firm, which are deemed reliable.

5.3.2 Population and sampling

The target population for this research encompasses of home-grown manufacturing firms located in Malaysia and foreign countries. Multinational corporations which are not originally from Malaysia such as Nestle and Nike were excluded. The Malaysian manufacturing industry was selected as the context for this study since the establishment and continued existence of such companies centre on their technological capability. Further, the Malaysian manufactured products have a competitive strength to compete in the global market and the industry has always been the most open sector in the Malaysia's liberalisation programme (Malaysian Investment Development Authority, 2012). Hence, the capabilities of the Malaysian manufacturing industry to enter into the high-tech, higher value added and global environment lies upon the competitiveness and innovativeness of the local firms.

In order to obtain a representative sample of manufacturing companies, the sampling frame was drawn from the list of companies that are registered with Federation of Malaysian Manufacturer (FMM). These agencies are responsible for assisting local organisations to compete in international markets. This database is frequently used as a sampling population for Malaysian studies, (Mohamed et al., 2009; Sulaiman & Jaafar, 2003). The numbers of total populations that are registered with the FMM, which are involved in international markets are 1615. They involved in various

industries including electronics/electrical, food and beverage, wood, paper, rubber, plastics, furniture, cosmetics, metals and chemical. These firms are strategically located in Peninsular Malaysia and operated closely and traded through Malaysia's international ports namely Penang Port, Port Kelang, Johor Port and Port of Tanjung Pelepas. Based on the population, the samples were selected using stratified random sampling approach (Table 5.4). Stratification was made based on the organisations' sector (e.g. electronics/electrical, food and beverage, wood, paper, rubber, plastics, furniture, cosmetics, metals and chemical) and location of the company. From these figures, this study selected 75 per cent of the target population for each stratum (Table 5.4), which was a good representation for the study given our target populations (Sekaran, 2003).

Table 5.4: Total Populations

Organisation's sector	**Populations**	**Sample size**
- Electrical and Electronics	378	284
- Food and beverage	213	160
- Furniture and wood based sector	180	135
- Paper and stationary	49	37
- Rubber based products	51	38
- Plastics products	80	60
- Clothing and foot wears	90	67
- Cosmetics and toiletries	120	90
- Automotive, metals and equipments	160	120
- Chemicals	294	221
Total	**1,615 companies**	**1,212**
i. Central Peninsular Malaysia (Kuala Lumpur, Selangor and Putrajaya, and Negeri Sembilan)	646	485
ii. Northern Peninsular Malaysia (Perak, Penang, Kedah, and Perlis)	566	424
iii. Southern Peninsular Malaysia (Johor and Malacca)	403	303
Total	**1,615 companies**	**1,212**

Initial contact with the sampling firms was made by telephone or email. The researcher explained the aims of the study, type of information interested and how the potential respondents were expected to participate. The issue of anonymity, confidentiality and voluntary participation were explained during the telephone conversation or in the email invitation. Upon receiving consent to participate from them, questionnaires were distributed. While the sampling size consists of 1,212 companies, only 1200 questionnaires were distributed, as 12 firms did not give their consent to participate.

5.3.3 Data collection procedures

This research was performed in two stages. In the first stage, the questionnaire was pilot tested with five academicians involved in the field of study. This process was conducted as a means to validate the content of the questionnaire items, in which they were required to ascertain any flaws in the questionnaire design and provide comments on the clarity of the questions. This process was carried out in February, 2014. The feedback (e.g. inconsistency of wording, unclear or ambiguous items) drawn from the pilot test with the five academicians was used to refine the questions. The refined questionnaire was enhanced and distributed to 30 manufacturing firms. Out of 30 questionnaires distributed, 19 organisations responded. At this stage, the respondents were asked to answer the questions and comment on the suitability and clarity of the questions. They were also encouraged to suggest any important questions that the survey failed to incorporate. The results of the pilot study led to some minor modifications of wording of the questionnaire.

The data from pilot study was used to generate the results of Cronbach's α. The acceptance level of Cronbach's α is 0.70 (Hair et al., 2014). Therefore, items with a value of less than 0.70 have been removed. Table 5.5 shows a summary of Cronbach's α and number of items in the pilot study.

Table 5.5 Summary of Items in the Pilot Study

Variable(s)	Number of Items	Reliability Cronbach's α
Technology capability	7	0.893
Organisational culture-fit	6	0.851
Logistics integration commitment	6	0.888
Trust	6	0.889
Strategic sourcing	6	0.843
Information Sharing	7	0.819
Global supply chain competitiveness	9	0.842

For the larger study, 1200 questionnaires were distributed to the potential respondents, who were willing to participate in the study in September, 2014. A self-administered questionnaire approach was employed as the numbers of sampling frame were considered high and they were located at various locations in Malaysia. In addition, this method also encourages respondents to provide more sensitive information owing to the anonymity of the process and non-existence of interview bias (Hair, Wolfinbarger, Ortinau & Bush, 2003). Out of 1200 questionnaires distributed, 233 were collected (162 usable and 71 incomplete). Since this technique is susceptible to low response rate (Churchill, 1979), few measures were employed to reduce the effect. First, the commitment to participate in this study was taken prior to the questionnaire distribution process and follow up through telephone and emails were made upon 2 weeks after distributing the questionnaire. After second circle of collection the total final responses were 177 with a response rate of 14.75 per cent.

Owing to the low response rate, this study conducted t-test to assure that non-response bias was not an issue (Armstrong & Overton, 1977). Assessment of non-response bias was performed by comparing the responses between the early and late respondents. Early respondents were those who had completed and returned the questionnaires within the initial one-month response window, while late respondents refer to those who returned the questionnaires after the reminder was sent. There were no statistically differences by using criterion of $p > 0.05$ between the two groups for any of the variables used in this study. Therefore, it is assumed that non-response bias is not a problem in this study and samples represent targeted group. Respondents completed the questionnaires with high accuracy which is over 98 per cent and missing data were treated by using SPSS 19 software.

5.4 Statistical analysis techniques

This section highlights the data analysis methods employed in this study. Structural equation modelling (SEM) was utilised as a primary data analysis technique. Differs from other multivariate techniques, SEM is capable in testing the entire model simultaneously and assessing measurement errors. These capacities are pertinent with the sizeable errors (Byrne & Heavey, 2001). As an alternative to covariance-based SEM (CBSEM), in which the method is focusing on estimating a set of model parameters, this study relied on variance-based SEM, using partial least square (PLS).

According to Mitchell and Nault (2007), PLS becomes as one of preferred methodological choice because it is suitable for small sample size. Therefore, researcher whose deals with small sample size due to difficulty in getting good response from respondents can choose PLS as their data analysis method. Similarly, McFarland,

Bloodgood and Payan (2008) suggested that PLS is suitable for unlimited number of formative indicators. Other factors that made PLS a favourable choice include (Chen et al., 2001):

i. PLS focuses on maximising the variance explained for all endogenous constructs in the model,

ii. The PLS parameter estimation process continuously fluctuates between estimating case values for the block variables and model parameters depending on case values,

iii. PLS does not suffer from improper solutions and factor indeterminacy as sometimes occurs in the context of CBSEM,

iv. The PLS does not require strong theoretical background. In addition, it only requires the structurally linking among the constructs to have the measurement and structural models.

Table 5.6 Analysis of Articles Using PLS in Methodological Choice

Author(s) and Journal	No assumption about measurement scale	Small sample size	Focus on theory development	Unlimited number of formative indicator	Does not suffer with factor indeterminacy
Ahuja, Galetta and Carley (Management Science, 2003)	√	√	√		
Arnett, Laverie and Mojers (Journal of Retailing, 2003)	√	√		√	√
Anderson, Fornell and Mazvancheryl (Journal of Marketing, 2004)	√			√	
Cotte and Wood (Journal of Consumer Research, 2004)		√			
Gray and Meister (Management Science, 2004)			√	√	
Gregoire and Fisher (Advances in Consumer Research, 2005)			√	√	
Hennig-Thurau, Groth, Paul and Gremler (Journal of Marketing, 2006)	√				

Ulaga and Eggert (Journal of Marketing, 2006)			√	√	
Al-Gahtani, Hubona and Wang (Information and Management, 2007)			√	√	√
Mitchell and Nault (Management Science, 2007)		√			
McFarland et al. (Journal of Marketing, 2008)				√	
Gudergan, Ringle, Wende and Will (Journal of Business Research, 2008)			√	√	√
Sarstedt(Journal of Modelling in Management, 2008)	√	√		√	√
Henseler, Ringles and Sinkovics (Advances in International Marketing, 2009)	√	√		√	√
Reinartz, Haelein and Henseler (Journal of Research in Marketing, 2009)	√	√		√	√
Hock, C. et al. (International Journal Services Technology and Management, 2010)				√	√
Hock, Ringle, and Sarstedt (International Journal Knowledge Management Studies, 2010)			√	√	√
Henseler (Comput Stat, 2010)		√		√	√

These attributes have made PLS a powerful tool which in increasingly being applied in various areas of research including supply chain (Table 5.6). Despite that this study is based on various established theories, PLS was used since owing to the small sample size, which made other techniques such as AMOS or LISREL not suitable to be performed. Given these considerations, PLS therefore serves as an appropriate data analysis tool for this research. The next section explains the steps taken in analysing the data.

5.4.1. Descriptive analysis

Prior to structural analysis, data were examined through various descriptive analyses which include frequencies, percentage, means, skew and kurtosis statistics. These analyses were performed to ensure that the data collected were suitable for Covariance based-SEM analysis. Missing data is a common issue of many cross-sectional study involving organisations owing to unwillingness to disclose certain information. In this study, patterns of missing data were inspected to determine the types and suitable treatment.

According to Rubin (1976), there are three types of missing data, requiring different types of treatment. They are missing completely at random (MCAR), missing at random (MAR) and missing not at random (MNAR). A datum is considered as *MCAR*, when the missing value is independent from other variables observed in the study and the patterns appear randomly. *MAR* refers for a datum that is missing owing to the factor that value of some observed variables in which the missing value is traceable and predictable. Finally, *MNAR* refers to a datum with a pattern of missingness that appears non-randomly and is not predictable from other variables in the dataset. While both MAR and MCAR missing values are ignorable, MNAR missingness can lead to biased parameters estimates and incorrect standard errors (Arbuckle, 1996).

Various techniques for handling missing data include listwise deletion, pairwise deletion, expectation maximisation (EM) algorithm and multiple imputations (MI) (Dempster, Schatzoff, Wermuth, 1977; Roth, Marucheck, Kemp & Trimble, 1994). Listwise deletion is performed by excluding an entire case that has missing data on any

variables from further analysis. Although this method is simple, the technique reduces the sample size drastically, leading to decreased statistical power (Bennett, 2001). In pairwise deletion, the mean and variance estimates are computed from the univariate complete data based on a correlation matrix (Graham, 2009). This method is preferred compared to listwise deletion since it uses more information from the data, which tends to provide a larger usable dataset. Nevertheless, the correlation matrix constructed may not be positive definite if there is considerable sampling variation due to a small sample size (Graham, 2009; Kim & Curry, 1977). Multiple imputation (MI) technique involves estimating missing data and parameters which is replicated a number of times (5 to 10 times) to produce a different set of imputed values, in which these values are utilised to estimate a particular model (Olinsky, Chen & Harlow, 2003). While this missing data treatment is considered as the best procedure for imputing values, owing to its ability to incorporate information by modelling either the known or uncertain reasons for the non-response (Montalto & Sung. 1996), this method requires an established data model to generate imputed values to ensure that they are accurate, which is impractical for this study (Olinskyet al., 2003).

While previous research has provided evidence of PLS's robustness in handling non-normal data, highly skewed data inflate bootstrap standard errors and may reduce statistical power, which raise issue since PLS has tendency to underestimate inner model relationships (Reinartz et al., 2009). Given this concern, this study conducted normality tests and examined the skewness and kurtosis values to ensure that the data were not extremely non-normal. A normal distribution of data will provide a skewness statistic of zero. Yet, this cut-off point is not achievable practically. Researchers consider a value of between -2 and +2 to represent a normal distributed data, while a value greater than 3 corresponds to an extremely skewed data distribution (Hu, Bentler

& Kano, 1992). A negative value of kurtosis score represents data that are distributed more dispersed, while a positive value of kurtosis indicates a more clustered data distribution (Tabachnick & Fidell, 1996). A kurtosis score greater than 8 is regarded as extremely non-normal distribution kurtosis (Kline, 1998), while a magnitude between 2 and 7 is regarded as moderate kurtosis. Following this, computations and analyses of various statistical values were performed. In this part, discussions on respondent profiles (age, number of employees, organization type, ownership, firm size, etc.) are presented. Depending on the type and nature of data collected, the use of parametric or non-parametric methods is employed. Using the one-way between groups ANOVA (post-hoc) test, differences in mean scores between the firm categories is to be determined.

5.4.2 Reliability and validity

Subsequently, the result of the measurement model was tested with two psychometric properties – validity and reliability. Both tests are important in measuring the measurement model, in which they evaluate the accuracy of measures developed to evaluate each construct. Reliability refers to the degree to which a set of two or more measures are measuring the same construct and error free (Hair et al., 1998). In this study, multiple items were used to measure each variable as this approach allows researchers to measure a wider range of conceptual domain and less prone to systematic error. While Cronbach's alpha appears as one of the most widely technique used to assess reliability, this technique is criticised by some scholars (Anderson & Gerbing, 1988) since the value tends to inflate with the numbers of items in a particular scale. Based on this argument, this study therefore evaluated the reliability of each construct

using composite reliability and average variance extracted, in addition to Cronbach's alpha.

Validity refers to the extent to which data collected truly represent the phenomenon being studied (Newman, 1997). Most common types of validity tested include content or face validity, construct validity and external validity. Content validity evaluates the degree to which the indicators measure the construct based on the judgement from expertise and sub populations. In this study, the content validity was satisfied using pilot test with academics in the supply chain area and 19 potential respondents from the sampling populations. The second typed of validity - construct validity measures the extent of consistency between the results obtained and theory developed. This research measures construct validity through convergent and discriminant validity. Convergent validity was evaluated by examining the loadings and their statistical significance through t-values (Anderson & Gerbing, 1988). Factor loadings above 0.50 and exceeding a t-value of 1.96 at the 0.05 level of significance provide a good convergent validity (Bollen, 1989; Holmes-Smith & Rowe, 1994). Discriminant validity on the other hand exists if the square root of the AVE for a construct exceeds the correlations with other constructs. Finally, the external validity measures the extent of generalisation of the research findings to other groups, subjects and settings (Sekaran, 2000). In this study, the external validity was enhanced through the use of quantitative analysis and stratified random sampling. The generalisability of the results was also enhance through the incorporation of various manufacturing firms from different types of industries such as food, electrical and electronic, furniture, rubber-based products and cosmetics.

5.4.3 Structural analysis

Upon established confidence in the measurement model, the main and mediating effects in the model were tested. A bootstrapping procedure with replacement and standard errors on the basis of 5000 bootstrapping was performed (Hair, Sarstedt, Hopkins & Kuppelwieser, 2014). This approach allows a stimulation of larger sample size by redrawing existing records in the sample and placing the drawn records back into the sampling pool to be potentially picked again (Chin, 2010). Moreover, by selecting the records in the sample randomly with large number of trials would lead to more robust model (Brown, 1998). The mediating effect exists if the independent variable affects the mediator in the first equation and dependent variable in the second equation. The mediator variable must also affect the dependent variable in the third equation (Baron & Kenny, 1986).

5.5 Conclusion

This chapter illustrates the sampling procedures adopted, operational measurement and methods that were utilised in answering the research questions. Forty items were adapted from the literature to measure seven constructs in the framework developed. Data were collected from 177 firms. Using various descriptive analyses tools, data were analysed to determine the respondents' populations in general as well as to ensure that the data collected were suitable for covariance based-SEM analysis. Various steps were taken to ensure the validity and reliability of the measurements employed. While the reliability of the measurement was assessed using the Cronbach's alpha and composite reliability, the validity was evaluated in terms of content, convergent and discriminant validity. Further tests which include common method bias were employed to test the

measurement validity. Finally, a structural model was formed, based on the results of measurement model, to examine the relationships between the variables in the conceptual framework, as well as to test the hypotheses developed. The following chapter discusses the results of the study.

CHAPTER 6: DATA ANALYSIS AND DISCUSSION

6.1 Introduction

As discussed in Chapter 5, various data analysis techniques including descriptive statistics, exploratory factor analysis, confirmatory factor analysis and structural equation modelling were performed using Statistical Processing for Social Science (SPSS) version 19 and Smart PLS softwares. This section presents the results from the data collected from this study. The chapter first describes the data preparation processes performed (e.g. missing data and outliers cases) and samples of demographic firms. Following this, the chapter reports the measurement model evaluation, in which various tests including reliability, validity and common method bias were conducted. The chapter finally discusses the results of the structural model and hypotheses testing.

6.2 Missing data analysis

This study runs frequency and missing value analyses in the first stage as a means to check on the accuracy of data entry processes. As illustrated in Appendix 1, the percentage of missing value was 0 and 1.69 per cent across all measures. The percentage of missing data in this data set is acceptable. Schafer (1999) asserted that a missing rate of 5% or less is inconsequential. It is also supported by Bennett (2001) with mentioned that maintained statistical analysis is likely to be biased when more than 10% of data are missing. A further inspection was made on the patterns of missing value. The results indicated that there were 10 cases with missing values of no more than two items within the data set. Based on the classification highlighted by Rubin (1976), the missing

data were found to be missing completely at random (MCAR). While listwise procedures might appears to be suitable for handling this type of missing data (Tabachnick & Fidell, 1996), some scholars encouraged researchers to go further by employing other techniques (Graham, 2009). A further examination of the procedures illustrated that expectation maximisation (EM) algorithm is more relevant to be employed in this study. While there are criticisms that EM algorithm may result in biased estimates and standard errors (Olinsky et al., 2003), this procedure provides the least biased method and is more accurate as compared to listwise deletion and pairwise deletion techniques (Malhotra, 1987), and continues to be one of the few recommended procedures for missing data imputation (Schafer & Graham, 2002). Given these arguments, this study therefore performed EM algorithm using the missing value analysis procedure in SPSS to impute the missing values. With no further cases excluded, this process yields a final sample consisting of 177 cases.

Table 6.1: Cases with missing values

Cases	Items	
11, 126	TC1	My organisation uses the most advanced IT system
60, 121	LC1	Logistics integration has a key role in our supply chain from the providing raw material to the end delivery
20	GS5	Compared to our competitors, our supply chain is capable to provide good workers and planning responsibility
38,102	IS6	Our organisation established network information in due to distribute sales information
105, 121,23	IS7	Our organisation used information sharing with suppliers and buyers via Extranet

6.3 Normality distribution

Upon completed the missing value analyses, skewness and kurtosis tests were performed to examine the data distribution. Consistent with Chou, Bentler, & Satorra (1991) and Hu et al. (1992), this study used a value of between -2.0 and +2.0 as a cut-

off point to represent a normally distributed data. As demonstrated in Appendix 2, all items had skewness value of below ± 1.0. The results further highlighted that out of 40 items, 39 items had skewness values of below ± 1.0, while 1 item had value between ± 1.0 and ±2.0.

Despite that all items tested in this research had skewness and kurtosis values that deviate from the value of zero, they were considered non-extreme, and illustrating that non-normality was not a significant issue. Hence, no further log transformation (e.g. square root, logarithm) of analysis is needed, since this action has only a minor effect when the univariate non-normality is moderate or slight (Cohen & Cohen, 1983). Furthermore, this study adopted PLS analysis as the primary analytic procedure, which is robust to the violation of non-normality data distribution. The bootstrapping method employed, which allow the researcher to create sub samples from the original data set, enables precise statistical results for non-normally distributed data with a sample size ranging from 50 to 400 (Chou et al., 1991; Schumacker & Lomax, 2004).

Table 6.2: Skewness and kurtosis tests

Scores	No. of items	Items
Skewness test		
below ±1.0	39	TC1, TC2, TC3, TC4, TC5, OC1,OC2, OC3, OC5, TR1, TR2, TR3, TR4, LC1, LC2, LC3, LC4, SS1, SS2, SS3, SS4, SS5, IS1, IS2, IS3, IS4, IS5, IS6, IS7, GS1, GS2, GS3, GS4, GS5, GS6, GS7, GS8, GS9.
between ± 1.0 and ±2.0	1	OC4
above ±2.0		None
Kurtosis test		
below ±1.0	39	TC1, TC2, TC3, TC4, TC5, OC1,OC2, OC3, OC5, TR1, TR2, TR3, TR4, LC1, LC2, LC3, LC4, SS1, SS2, SS3, SS4, SS5, IS1, IS2, IS3, IS4, IS5, IS6, IS7, GS1, GS2, GS3, GS4, GS5, GS6, GS7, GS8, GS9.
between ± 1.0 and ±2.0	1	OC4
above ±2.0	0	None

6.4 Respondents' Profiles

Table 6.3 depicts the sample characteristics of the SMEs number of Employees according to SMECorp Malaysia. Table 6.4 is a Respondent Profile. The results indicate that majority of the responding firms are from electrical and electronic industry. Almost half of the responding firms have operated more than 11 years, with majority of them employed less than 200 employees. This figure indicates that the respondents are mainly characterised by small and medium enterprises. With respect to the number of years that the manufacturing companies had been in operation, almost 50 per cent of them had been operating for less than 10 years. Less than 10 per cent of the sample however had been established over 30 years ago. In terms of supply chain partners, majority of the manufacturers deal with small supplier based, with 42.4 per cent had between below 50 suppliers. The small number of suppliers is expected to enable the local manufacturing firms to integrate processes and form strategic alliances with suppliers, and further utilise supplier strengths and technologies to support their new product development process, leading to enhanced global supply chain competitiveness. According to SMECorp Malaysia (2016), full-time employee numbers for small and medium size manufacturing company is not exceed than 200 employees as stated below:

Table 6.3: SMEs Number of Employees (SMECorp, 2016)

Size/ Sector	Manufacturing	Services
Small	5 – 75 employees	5 – 30 employees
Medium	75 – 200 employees	30 – 75 employees

Figure 6.1 reports the distribution of companies by location. The figure shows that majority of the responding companies are located in the West Coast of Peninsular Malaysia, specifically Selangor and Penang. This is expected as these locations are

industrialised and have ports facilities. In order to gain a more complete picture of information sharing, this study is interested to determine the supply chain technology adopted by the local manufacturers. These technologies are primarily concerned with information sharing within and between organisations and are used in managing supply chain related data and activities.

Table 6.4: Respondent Profiles

Profile	Frequency	Percentage
By Years of Operation		
Below 10 years	79	44.6
11 to 20	53	29.9
21 to 30	28	15.8
31 and above	17	9.6
By Number of Suppliers		
1 to 50	75	42.4
51 to 100	55	31.1
101 to 150	27	15.3
151 and above	20	11.3
By Number of Buyers		
1 to 50	62	35.0
51 to 100	50	28.2
101 to 500	39	22.0
501 to 1500	14	7.9
1501 and above	12	6.8
By Number of Employees		
5 to 75	54	30.5
76 to 200	94	53.1
201 and above	29	16.4

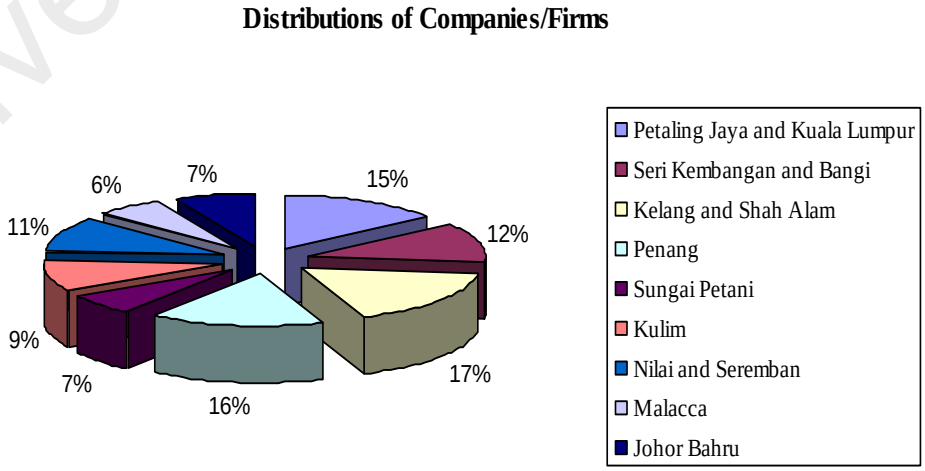

Figure 6.1: Distribution of Companies by Location

Figure 6.2 presents the distribution of supply chain technology adoption among the responding firms. The findings indicated that bar coding and computer aided design (CAD) had the highest adoption rate, with more than 60 per cent of the companies reporting to have adopted the technologies. Afairly large number of responding firms adopted bar coding technologies. These technologies are used in conjunction with other systems such as WMS and TMS as well as a means to track and control inventory. Being a high payoff and low risks technology, bar coding is one of the most commonly used methods of electronic identification, as compared to other tracking technologies such as RFID. Although RFID provide potential benefits for manufacturers, this technology was not adopted as much as expected in the local industry. Higher setup, maintenance and technology upgrade costs could be the reason for such trend (Wei et al. 2015; Attaran 2007). In the case of CAD, This is expected as the technology is more applicable to manufacturers since the tools could be used to design parts and fixtures. Moreover, CAD system is considered as matured technologies and less costly as compared to others. While integrative technologies such as Enterprise Resource Planning (ERP) has been adopted by more than one-third of responding firms, Supply Chain Planning (SCP) has a quite low adoption rates. Despite the costs being the barrier of further diffusion of such technologies, perhaps, the human factor – mistrusts and desire to focus more on individual supply chain function may also play a role.

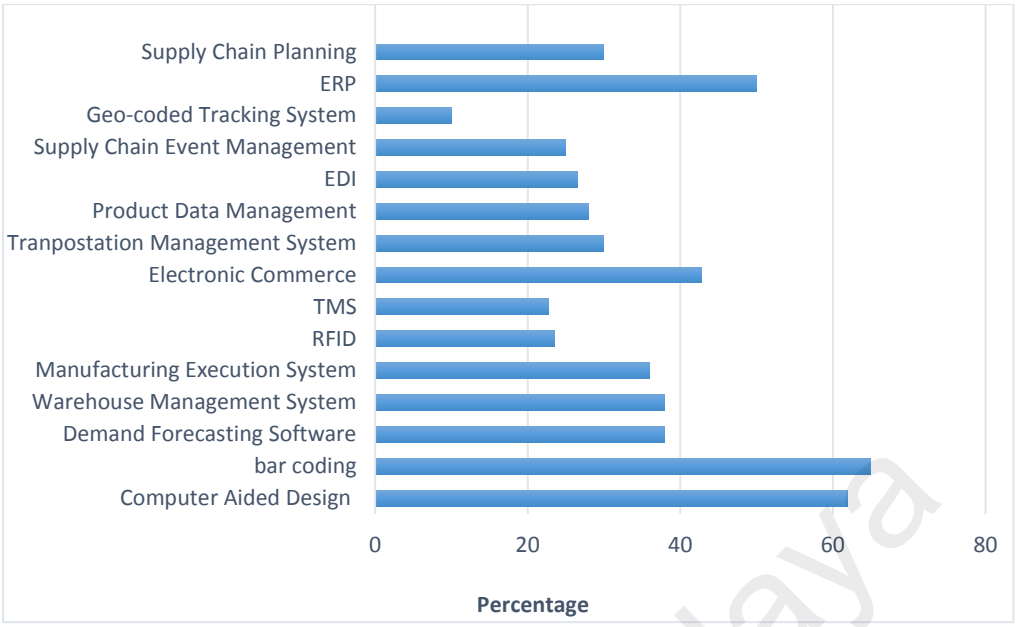

Figure 6.2: Distribution of Supply Chain Technology Adoption

There is a wide range of information that could be shared among the firms along the supply chain. In view of different level of decision-making in supply chain management, information sharing could be strategic and operational (Zailani et al., 2008). Figure 6.3 depicts the types of information shared between the responding firms and their supply chain partners. As illustrated by the Figure 6.3, higher percentage of the manufacturing firms place greater emphasis on operational information exchange (advanced shipping notice, order status, production schedules, inventory levels) rather than strategic information exchange (pricing strategies, new target markets, distribution strategies, promotion strategies, technological know-how). This operational information relates to day-to-day activities, which are required in managing people, materials and tools. While both strategic and operational information are important in enhancing performance, it is more difficult to obtain strategic information. Perhaps, this result may be due to the fact that firms tend to treat strategic information as strictly confidential owing to the competitive reasons (Ramayah & Omar, 2010).

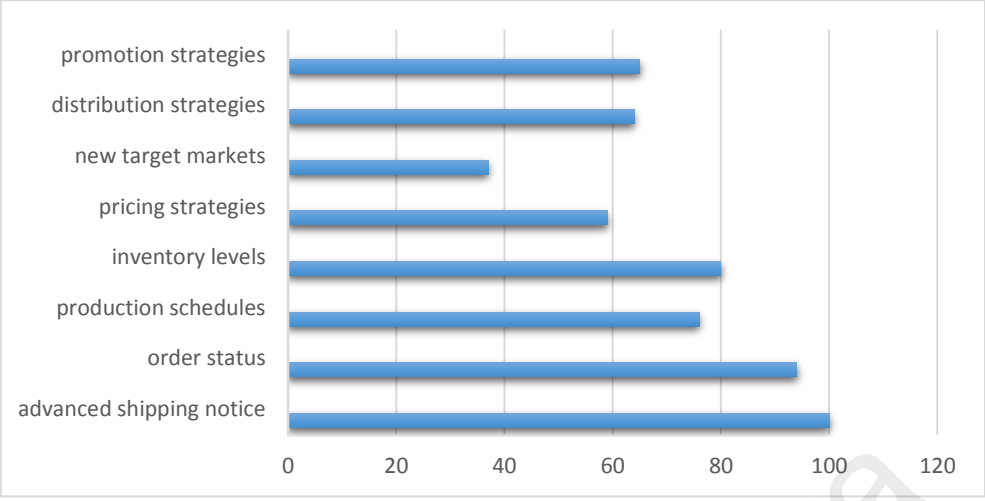

Figure 6.3: Percentage of Information Shared by Types

6.5 Descriptive Analysis of Measurement Items

Table 6.5 shows the mean and standard deviations of all items, as well as Cronbach's alpha of each construct. All items were measured using a 7-point Likert scale. All constructs had Cronbach's alpha values of above the cut-off point - 0.70, indicating that these scales are reliable (Nunnally, 1978). The results indicate that mean scores of global supply capabilities are quite high, highlighting that the local manufacturing firms in the sample do possess competence to compete globally. Differs from the study conducted by Rahman et al. (2012), which found lack of resources (e.g. manpower and financial, technological tools, and lack of knowledge, skill and expertise) as the main problems faced by the SMEs in managing their supply chains, this study highlighted that firms in the sample have relatively high scores of technology capability and information sharing. Perhaps, the sampling frame of respondents which focus only towards local firms that have international businesses might lead to the contradictory result. As the responding firms in this study consist of global companies, they are more inclined to engage in supply chain management practice such as information sharing. Furthermore, as they compete internationally, their operations might be driven by few

large MNCs, which might require its local suppliers to engage in supply chain management practice (Pandiyan, Ibrahim & Chandran, 2011). Indeed, supply chain management including information sharing practice is seen as a tool to cope with intense competition and pressure to bring the product to market faster. The government's incentives and support might also prepare local industries that compete in international markets to adopt SCM.

In general, the responding firms shared a compatible organisational and cultural value across the supply chain. On a similar vein, these firms also reported a considerable level of trust among partners, which may help them in promoting information sharing and coordination.

Table 6.5: Descriptive Analysis

Items	Description	M	SD	Cronbach's Alpha
Technology capability				
TC1	My organisation uses the most advanced IT systems	4.98	1.30	0.782
TC2	My organisation has skilled and knowledgeable IT staff	4.98	1.24	0.783
TC3	My organisation is experienced in deploying IT applications	4.07	1.2	0.838
TC4	Our supply chain partners' information systems are technically compatible with those of our firm.	5.13	1.16	0.803
TC5	There are direct computer-to-computer links with my key supply chain partners	4.99	1.28	0.783
Organisational culture-fit				
OC1	In dealing with different culture, we have shared a similar corporate culture and management style	4.97	1.15	0.752
OC2	Our organization considers specific cultural aspects for both supply chain partners and other entities within the market	5.05	1.15	0.707
OC3	The organisational values and social norms between our firms and supply chain partners are congruent	5.26	1.13	0.787
OC4	Managers from our firm and those of our supply chain partners exhibit compatible philosophies in business dealings	5.43	1.07	0.761
OC5	Our firm's procedures are compatible with supply chain partners' business procedures	5.42	1.18	0.749
Trusts				
TR1	Our supply chain partners never act opportunistically	4.95	1.33	0.737
TR2	We are not worry that our supply chain partners will take advantage of us	5.30	1.25	0.720
TR3	We believe that our suppliers are honest in business dealings.	5.39	1.06	0.700

TR4	We are confident our supply chain partners respect the confidentiality of the information they received from us.	5.37	1.18	0.775
Logistics integration commitment				
LC1	Logistics integration has a key role in our supply chain from the providing raw material to the end delivery.	5.11	1.21	0.737
LC2	We have seamless integration of logistics activities with our key supply chain partners	5.21	1.11	0.754
LC3	The inbound and outbound distribution of goods with our supply chain partners is well integrated	5.09	1.01	0.752
LC4	Inter-organisational logistics activities are closely coordinated	5.01	1.09	0.880
Strategic sourcing				
SS1	We heavily source components and semi-processed products across national boundaries	4.33	1.45	0.829
SS2	We gain access to our suppliers' capabilities to design and develop major components and finished products	4.84	1.45	0.809
SS3	Technical engineering activities are the main characteristic for supplier involvement in this organization.	4.86	1.25	0.773
SS4	We are well informed about our supplier's product and market	4.39	1.36	0.755
SS5	We depend on supplier's knowledge and expertise in developing new product	4.35	1.32	0.741
Global supply chain competitiveness				
GS1	Compared to our competitors, our supply chain is capable to provide low cost distribution.	5.47	1.23	0.777
GS2	Compared to our competitors, our supply chain is capable to provide effective intensive local distribution coverage.	5.39	1.11	0.814
GS3	Compared to our competitors, our supply chain is capable to effectively target selective distribution outlets.	5.40	1.07	0.779
GS4	Compared to our competitors, our supply chain is capable to assessing information network for both global and local marketplace.	5.25	1.28	0.761
GS5	Compared to our competitors, our supply chain is capable to provide good workers and planning responsibility	5.23	1.32	0.797
GS6	Compared to our competitors, our supply chain is capable to use advanced technology.	5.06	1.18	0.751
GS7	Compared to our competitors, our supply chain is capable to use JIT strategy.	5.15	1.20	0.743
GS8	Compared to our competitors, our supply chain is capable to increase production capacity.	5.34	1.19	0.735
GS9	Compared to our competitors, our supply chain is capable to share the information	5.09	1.26	0.730
Information sharing				
IS1	Our organization exchange and share the information related to changes in the end-users need, preference, and behaviour.	4.97	1.27	0.777
IS2	Our organization exchange and share the information related to changes in the technology of the focal products.	4.85	1.35	0.773
IS3	Our organization exchange and share the information within the network as soon as unexpected problem arise.	4.86	1.20	0.755
IS4	Our organization exchange and share the information in the organizations' strategies and policies with network partner.	4.84	1.22	0.741
IS5	Our organization exchange and share the information of financial performance and organization know-how within network partner	4.67	1.35	0.752

IS6	Our organization established network information in due to distribute sales information.	4.70	1.35	0.772
IS7	Our organization used information sharing with suppliers and buyers via Extranet.	4.76	1.53	0.776

6.3 Non-Response Bias

The response from selected respondent firms has been divided into two waves (Armstrong & Overton, 1977). Non-response bias was addressed by splitting the respondents into two groups, representing the early and the late wave of returned surveys questionnaires as suggested by Chen and Paulraj (2004). The first wave consists of 162 respondents, and the second wave comprises of the late returned responses from 15 respondents. As shown in Table 6.6, the t-test analysis has indicated that there are no significant differences ($p < 0.05$) between the two groups of responses. The results shown that non-response bias appears are not to be a problem in this study.

Before further analysis is performed, it is that necessary to be fulfilled by the data set are tested. Correlations and linearity among the questionnaire items, normality, collinearity, and multicollinearity checks.

Table 6.6: An Assessment on Non-Response Bias

Factors	Early respondents (n=162)	Late respondents(n= 15)	T-value	Significant
Technology capability	4.83	4.92	1.22	0.24
Organisational culture-fit	5.23	5.13	1.20	0.18
Trust	5.25	5.12	1.10	0.13
Logistics integration commitment	5.11	5.01	1.20	0.21
Strategic sourcing	4.55	4.52	0.56	0.45
Information sharing	4.81	4.83	1.08	0.11
Global supply chain competitiveness	5.26	5.12	0.57	0.45

6.6 Correlations and Linearity

The correlation matrix between the measurement items was performed and the results show that all *r* coefficients are positive and most of the values are above 0.3 (medium to large strength) and significant at 0.05 level of significance. The linear relationship of variables, as suggested by Hair et al. (2006) can be checked by the P-P plots. A visual inspection of the P-P plots in Figure 6.4 indicates that the items from predictor variables are linearly related to those from the criterion variables. Multicollinearity is checked based on the variance inflating factor (VIF) and tolerance (Pallant, 2005). The calculated values for the two indicators are presented in Table 6.7. A visual inspection of these results indicates that the problem of multicollinearity is not to be anticipated as VIF values are less than 10 and the tolerance values are above 0.1, but < 1.0.

Table 6.7: Multicollinearity Test Results

Variables Tested	Variance Inflating Factor (VIF)	Tolerance	Remarks
Technology capability and Competitiveness	1.869	0.535	No Problem
Organisation Cultural-fit andCompetitiveness	1.869	0.535	No Problem
Logitics Integration Commitment and Competitiveness	3.426	0.292	No Problem
Trust and Competitiveness	2.317	0.432	No Problem
Information Sharing and Competitiveness	2.592	0.386	No Problem

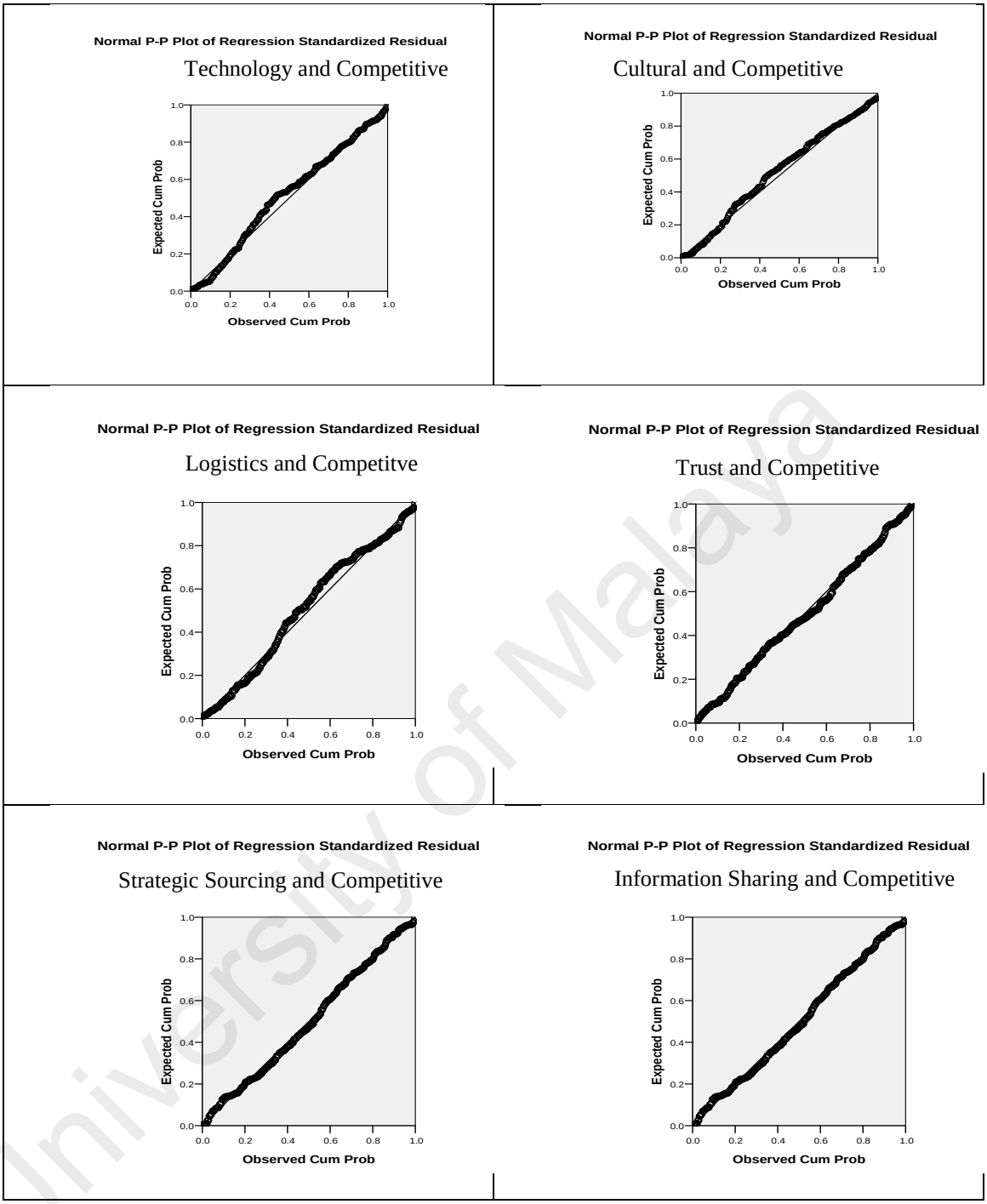

Figure 6.4: Normal p-p Plots of Regression Standardised Residuals

6.5 Measurement model

6.5.1 Exploratory Factor Analysis

Prior to confirmatory factor analysis (CFA), exploratory factor analysis (EFA) was conducted to determine the unidimensionality of the constructs developed. In line with Gerbing and Hamilton (1996), this research considered EFA as a precursor to CFA since some of the measurement used was adapted from prior case studies and anecdotes which have not been validated in quantitative works. Moreover, this approach was seen as necessary as the measurements were used in a different context – Malaysian environment. The suitability of the data for this analysis was evaluated based on the Kaiser-Meyer-Olkin (KMO) and the Bartlett's test of sphericity results. The Kaiser-Meyer-Olkin (KMO) serves an indicator (between 0 and 1) for measurement of sample adequacy. A value close to 1 indicates that patterns of correlations among items are relatively compact; and would produce distinct and reliable factor loadings. The KMO value of above 0.60 (Kaiser, 1974) and a Bartlett's test of sphericity*p*-value lesser than 0.05 (Bartlett, 1950) were used as indicators. The result for the Bartlett's Test of Sphericity (BTS) was large, and associated with a very small value of significance ($p < 0.001$). Hence, this proves that the data were appropriate for EFA. The KMO result of the analysis in this study is 0.685 and hence adequate and appropriate for EFA to yield reliable outcomes.Factors were extracted using Principal Axis Factoring with Varimax Rotation. Three constraining rules were employed as guidance for identification of the factors (Hair *et al.*, 1998) – eigenvalue greater than 1; factor loading greater than 0.50; and no item cross-loading greater than 0.50.

The total number of items retained for each variable, their distribution in each construct, as well as the Eigen value and the Cronbach's alpha are presented (Table 6.8). All Cronbach alpha values are above the limit of 0.70 established by Nunnally (1978) to ensure the constructs' internal consistency and validity.

Table 6.8: Exploratory Factor Analysis

Items	Description	Loading	Variance explained	Eigen-value
Technology capability				
TC1	My organisation uses the most advanced IT systems	0.855	15.961	6.07
TC2	My organisation has skilled and knowledgeable IT staff	0.852		
TC3	My organisation is experienced in deploying IT applications	0.801		
TC4	Our supply chain partners' information systems are technically compatible with those of our firm.	0.861		
TC5	There are direct computer-to-computer links with my key supply chain partners	0.851		
Organisational culture fit				
OC1	In dealing with different culture, we have shared a similar corporate culture and management style	0.884	10.871	4.13
OC2	Our organisation considers specific cultural aspects for both supply chain partners and other entities within the market	0.863		
OC3	The organisational values and social norms between our firms and supply chain partners are congruent	0.912		
OC4	Managers from our firm and those of our supply chain partners exhibit compatible philosophies in business dealings	0.921		
OC5	Our firm's procedures are compatible with supply chain partners' business procedures	0.868		
Trusts				
TR1	Our supply chain partners never act opportunistically	0.750	8.763	3.33
TR2	We are not worry that our supply chain partners will take advantage of us	0.844		
TR3	We believe that our suppliers are honest in business dealings.	0.821		
TR4	We are confident our supply chain partners respect the confidentiality of the information they received from us.	0.825		

Logistics integration commitment				
LC1	Logistics integration has a key role in our supply chain from the providing raw material to the end delivery.	0.931	7.388	2.81
LC2	We have seamless integration of logistics activities with our key supply chain partners	0.944		
LC3	The inbound and outbound distribution of goods with our supply chain partners is well integrated	0.898		
LC4	Inter-organisational logistics activities are closely coordinated	0.937		
Strategic sourcing				
SS1	We heavily source components and semi-processed products across national boundaries	0.832	6.211	2.36
SS2	We gain access to our suppliers' capabilities to design and develop major components and finished products	0.899		
SS3	Technical engineering activities are the main characteristic for supplier involvement in this organization.	0.862		
SS4	We are well informed about our supplier's product and market	0.911		
SS5	We depend on supplier's knowledge and expertise in developing new product	0.913		
Global supply chain competitiveness				
GS1	Compared to our competitors, our supply chain is capable to provide low cost distribution.	0.769	4.991	1.90
GS2	Compared to our competitors, our supply chain is capable to provide effective intensive local distribution coverage.	0.866		
GS3	Compared to our competitors, our supply chain is capable to effectively target selective distribution outlets.	0.910		
GS4	Compared to our competitors, our supply chain is capable to assessing information network for both global and local marketplace.	0.949		
GS5	Compared to our competitors, our supply chain is capable to provide good workers and planning responsibility	0.953		
GS6	Compared to our competitors, our supply chain is capable to use advanced technology.	0.912		
GS7	Compared to our competitors, our supply chain is capable to use JIT strategy.	0.845		
GS8	Compared to our competitors, our supply chain is capable to increase production capacity.	0.855		
GS9	Compared to our competitors, our supply chain is capable to share the information	0.865		

Information sharing				
IS1	Our organization exchange and share the information related to changes in the end-users need, preference, and behaviour.	0.923	4.51	1.72
IS2	Our organization exchange and share the information related to changes in the technology of the focal products.	0.898		
IS3	Our organization exchange and share the information within the network as soon as unexpected problem arise.	0.801		
IS4	Our organization exchange and share the information in the organizations' strategies and policies with network partner.	0.876		
IS5	Our organization exchange and share the information of financial performance and organization know-how within network partner	0.799		
IS6	Our organization established network information in due to distribute sales information.	0.796		
IS7	Our organization used information sharing with suppliers and buyers via Extranet.	0.757		

6.5.2 Confirmatory Factor Analysis

A confirmatory factor analysis (CFA) was performed to validate the psychometric properties of the measurements through investigating its unidimensionality, convergent and discriminant validity as well as reliability. The CFA was conducted on the whole set of items simultaneously. This study employed Maximum Likelihood estimations to assess the model. Figure 6.5 depicts the measurement model.

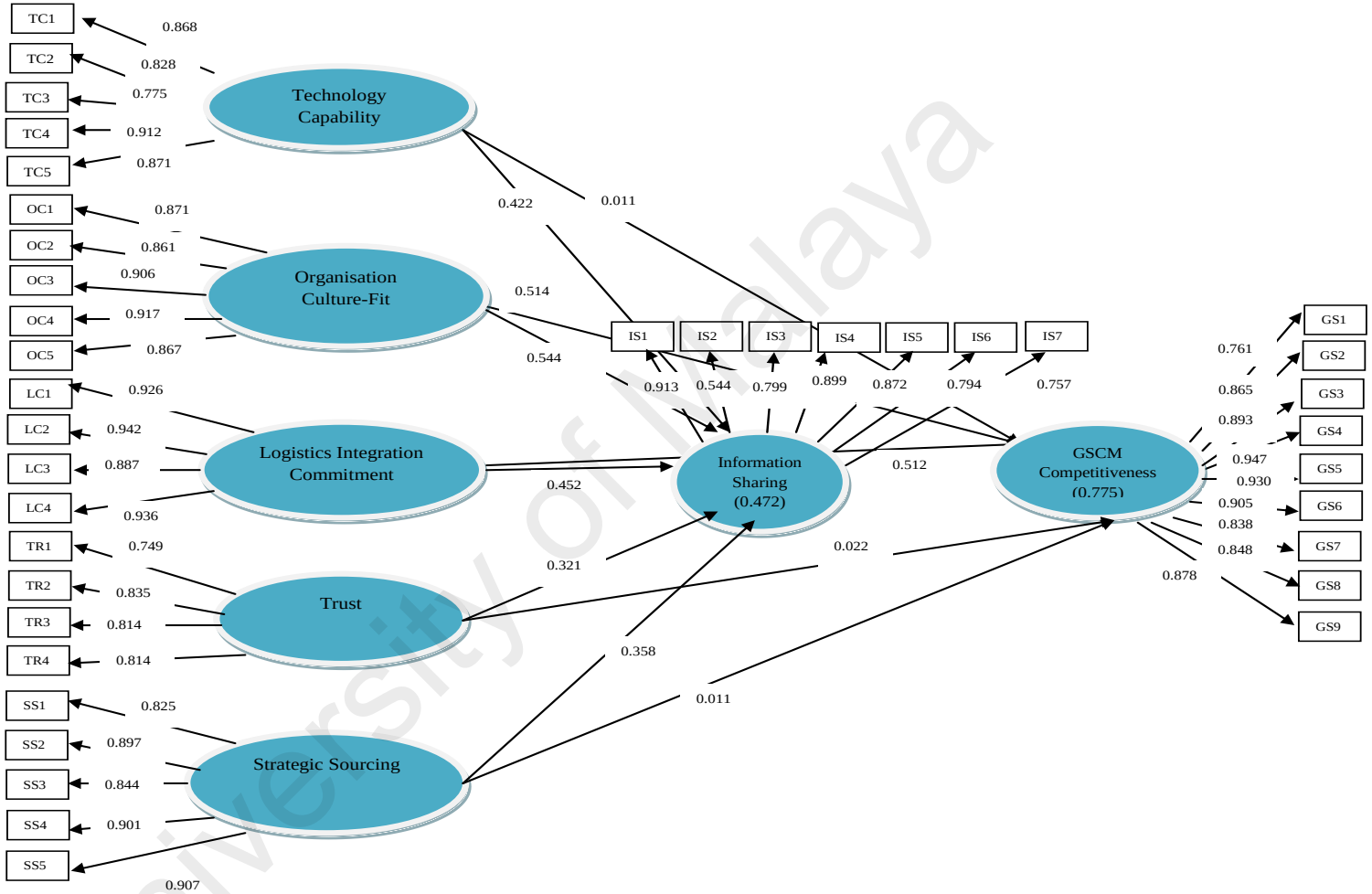

Figure 6.5: Measurement Model

6.5.2.1 Unidimensionality and Convergent Validity

Convergent validity, which refers to the degree of correlations between two or more measures of the same concept, was evaluated by examining the factor loadings and their statistical significance through t-values (Anderson & Gerbing, 1988). As represented in Table 6.9, all the constructs tested in the full measurement model had factor loadings above 0.50 and t-values greater than 1.96. This result suggested that all indicators were significantly related to their respective constructs, and therefore achieved the convergent validity and unidimensionality (Bollen 1989; Holmes-Smith & Rowe, 1994).

Table 6.9: Factor loadings

Items	Description	Loading	t-value
Technology capability			
TC1	My organisation uses the most advanced IT systems	0.868***	11.97
TC2	My organisation has skilled and knowledgeable IT staff	0.828***	6.86
TC3	My organisation is experienced in deploying IT applications	0.775***	5.96
TC4	Our supply chain partners' information systems are technically compatible with those of our firm.	0.912***	13.15
TC5	There are direct computer-to-computer links with my key supply chain partners	0.871***	12.90
Organisational culture-fit			
OC1	In dealing with different culture, we have shared a similar corporate culture and management style	0.871***	31.27
OC2	Our organization considers specific cultural aspects for both supply chain partners and other entities within the market	0.861***	51.80
OC3	The organisational values and social norms between our firms and supply chain partners are congruent	0.906***	37.56
OC4	Managers from our firm and those of our supply chain partners exhibit compatible philosophies in business dealings	0.917***	51.33
OC5	Our firm’s procedures are compatible with supply chain partners’ business procedures	0.867***	23.68

Trusts			
TR1	Our supply chain partners never act opportunistically	0.749***	12.24
TR2	We are not worry that our supply chain partners will take advantage of us	0.835***	20.79
TR3	We believe that our suppliers are honest in business dealings.	0.814***	16.92
TR4	We are confident our supply chain partners respect the confidentiality of the information they received from us.	0.814***	41.64
Logistics integration commitment			
LC1	Logistics integration has a key role in our supply chain from the providing raw material to the end delivery.	0.926***	58.50
LC2	We have seamless integration of logistics activities with our key supply chain partners	0.942***	94.40
LC3	The inbound and outbound distribution of goods with our supply chain partners is well integrated	0.887***	44.76
LC4	Inter-organisational logistics activities are closely coordinated	0.936***	41.09
Strategic sourcing			
SS1	We heavily source components and semi-processed products across national boundaries	0.825***	7.32
SS2	We gain access to our suppliers' capabilities to design and develop major components and finished products	0.897***	14.25
SS3	Technical engineering activities are the main characteristic for supplier involvement in this organization.	0.844***	8.25
SS4	We are well informed about our supplier's product and market	0.901***	9.79
SS5	We depend on supplier's knowledge and expertise in developing new product	0.907***	13.81
Global supply chain competitiveness			
GS1	Compared to our competitors, our supply chain is capable to provide low cost distribution.	0.761***	24.06
GS2	Compared to our competitors, our supply chain is capable to provide effective intensive local distribution coverage.	0.865***	36.55
GS3	Compared to our competitors, our supply chain is capable to effectively target selective distribution outlets.	0.893***	43.30
GS4	Compared to our competitors, our supply chain is capable to assessing information network for both global and local marketplace.	0.947***	97.65
GS5	Compared to our competitors, our supply chain is capable to provide good workers and planning responsibility	0.930***	86.56
GS6	Compared to our competitors, our supply chain is capable to use advanced technology.	0.905***	51.98
GS7	Compared to our competitors, our supply chain is capable to use JIT strategy.	0.838***	31.52
GS8	Compared to our competitors, our supply chain is capable to increase production capacity.	0.848***	34.86
GS9	Compared to our competitors, our supply chain is capable to share the information	0.878***	41.98

Information sharing			
IS1	Our organization exchange and share the information related to changes in the end-users need, preference, and behaviour.	0.913***	66.46
IS2	Our organization exchange and share the information related to changes in the technology of the focal products.	0.894***	54.97
IS3	Our organization exchange and share the information within the network as soon as unexpected problem arise.	0.799***	22.93
IS4	Our organization exchange and share the information in the organizations' strategies and policies with network partner.	0.899***	60.48
IS5	Our organization exchange and share the information of financial performance and organization know-how within network partner	0.872***	41.08
IS6	Our organization established network information in due to distribute sales information.	0.794***	23.98
IS7	Our organization used information sharing with suppliers and buyers via Extranet.	0.757***	18.53

*Note ***p is significant at 0.001 level*

6.5.2.2 Discriminant Validity

In this study the discriminant validity was evaluated by comparing the square root of the AVE for a given construct with its correlations between other constructs. The discriminant validity is achieved if the square root of AVE exceeds the correlations (Fornell & Larcker 1981). As illustrated in Table 6.10, all the constructs had higher values of squared AVE compared to their correlations, thus demonstrating discriminant validity (Hair et al., 1998; Nunnally, 1978).

Table 6.10: Discriminant Validity

Construct	1	2	3	4	5	6	7
1.Logistics integration commitment	**0.92**						
2. Organisation culture –fit	0.596	**0.78**					
3. Technology capability	0.588	0.642	**0.85**				
4. Trust	0.636	0.585	0.582	**0.81**			
5. Strategic sourcing	0.574	0.465	0.605	0.410	**0.88**		
6. Information sharing	0.534	0.441	0.591	0.653	0.672	**0.85**	
7. Global supply chain competitiveness	0.632	0.695	0.653	0.466	0.553	0.356	**0.87**

Note: The numbers in bold in the diagonal row are square roots of the AVE

6.5.2.3 Reliability

This study employs Cronbach's alpha test, composite reliability and average variance extracted (AVE) to evaluate the reliability of all the constructs of interest. As discussed in Chapter 5 (Section 5.4.4), the composite reliability and AVE were evaluated using Fornell and Larcker's (1981) approach. Table 6.11 illustrates that all the constructs had Cronbach's alpha and composite reliability values of above 0.80. In addition, the AVE values for these constructs were all above the recommended threshold value of 0.50. Therefore, all the scales were considered to exhibit sufficient internal reliability and consistency (Bagozzi & Yi, 1988; Nunnally, 1978).

Table 6.11: Reliability Tests

Constructs	Composite Reliability	Average Variance Extracted (AVE)	Cronbach alpha (α)
Technology capability	0.93	0.73	0.91
Organisational culture-fit	0.95	0.78	0.93
Logistics integration commitment	0.96	0.85	0.94
Trust	0.88	0.65	0.85
Strategic sourcing	0.94	0.76	0.93
Information sharing	0.95	0.72	0.93
Global supply chain competitiveness	0.97	0.77	0.96

In summary, the measurement model satisfied various validity and reliability statistical analyses. Therefore, constructs developed in this measurement model could be used to test the structural model and the associated hypotheses.

6.6 Common Method Bias

In addition to reliability and validity statistical analyses performed, this study also performed a common method bias analysis. This approach is important as this research depends only on a single key informant (Bagozzi & Yi, 1991; Nunnally, 1978). Consistent with Podsakoff et al. (2003), the existence of common method bias was determined by performing a Harman's single-factor test. This approach utilises an EFA based on PAF and oblique rotation, in which the common-method bias exists if the analysis results in a single factor solution, or if one of the factors converged, accounts for the majority of the covariance among the measures. Table 6.12 reports the result of the Harman's single-factor test. The resulting solution yielded in a seven-factor solution with an eigenvalue greater than 1. The first factor accounted for 15.9 per cent of the variance, while the six factors together accounted for 54.18 per cent of the variance, indicating that common method bias was not a significant issue (Podsakoff et al., 2003)

Table 6.12: Harman's single-factor test

Factor	Eigen-values	Variance
1	6.07	15.96
2	4.13	10.87
3	3.33	8.76
4	2.81	7.39
5	2.36	6.21
6	1.90	4.99
7	1.72	4.51

6.7 Structural Model and hypotheses testing

The structural model (Figure 6.6) was evaluated using R^2 estimates, standardised path coefficients (β), and significance level (t-statistics). The R^2 estimates measure the model's predictive power while path loadings illustrate the strength between the variables tested. The R^2 values are greater than the recommended threshold of 0.10 (Falk & Miller, 1992). The model explains 77.5 per cent of variance in GSCM competitiveness and 47.2 per cent of the variance in information sharing. The results highlight that the R^2 generated by the model could be considered acceptable and substantive.

Supply Chain Capabilities

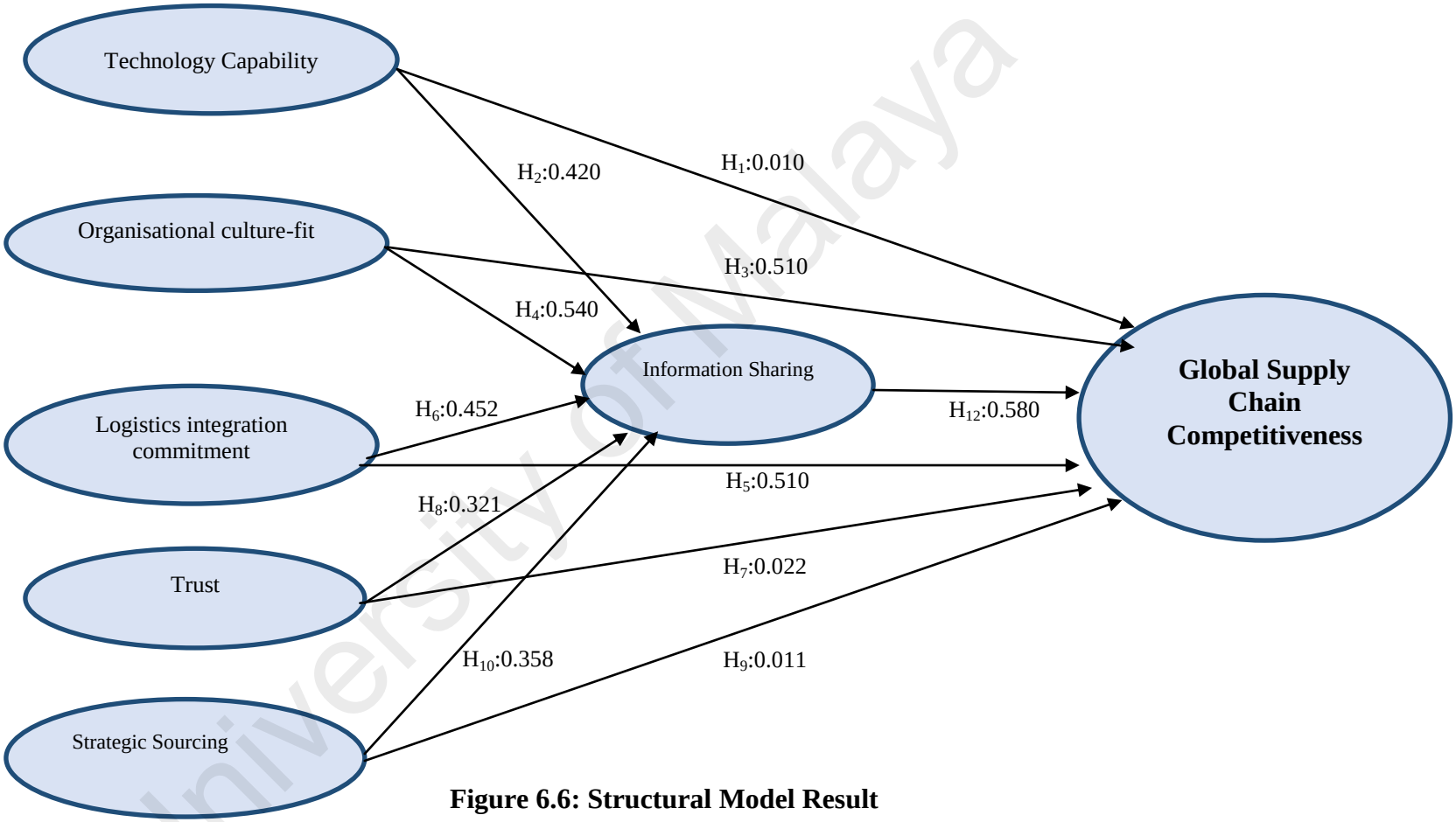

Figure 6.6: Structural Model Result

6.7.1 Testing direct relationship

The next steps in assessing the structural model are to examine the hypothesized relationships among constructs in the model. The explanatory power of the model was determined by examining how well the observed data fit the hypothesized relationship among the constructs. Following Chin (1998), bootstrap re-sampling approach was employed to test the statistical significant of each coefficient. As recommended by Hair et al. (2014), five thousand iterations using randomly selected subsamples were performed to test the hypothesized relationships. Table 6.13 depicts the beta coefficients and t-values for the first 11 direct hypotheses. As depicted, this study found support for eight out of 11 hypotheses tested.

Table 6.13: Estimated Path Coefficient – Direct Effect

Path	B	t-value	Hypotheses	Results
GS←----TC	0.01	0.91	H_1	Not Supported
GS ←----OC	0.51	6.44***	H_3	Supported
GS ←----LC	0.51	3.95***	H_5	Supported
GS ←----TR	0.02	0.45	H_7	Not Supported
GS ←----SS	0.01	0.24***	H_9	Not Supported
IS←----TC	0.42	3.99	H_2	Supported
IS←----OC	0.54	6.33***	H_4	Supported
IS←----LC	0.45	3.95***	H_6	Supported
IS←----TR	0.32	4.03***	H_8	Supported
IS←----SS	0.36	4.23***	H_{10}	Supported
GS<-----IS	0.58	7.97***	H_{11}	Supported

Note ***p is significant at 0.001 level, TC=technology capability, OC-organisational culture-fit, TR=trust, LC=logistics integration commitment, SS=strategic sourcing, IS=information sharing, GS=global supply chain competitiveness

Accordingly, technology capability was significantly related to information sharing (β=0.42; t=3.99; *p*<.001), but had no direct impact on global supply chain competitiveness (β=0.01; t=0.91, ns), thus supporting H_2 and rejecting H_1.

Organisational culture-fit was significantly correlated with global supply chain competiveness (β=0.51; t=6.33; *p*<.001) and information sharing (β=0.54; t=6.44; *p*<.001). Hence, the results support H_3 and H_4. The result also highlight that logistics integration commitment was significantly related to global supply chain competitiveness (β=0.51; t=3.95; *p*<.001) and information sharing (β=0.45; t=3.95; *p*<.001). The findings provide support for H_5 and $H_{6.}$ As expected, trust was positively related to information sharing (β=0.32; t=4.03; *p*<.001). Yet, trust was found to be insignificantly associated with global supply chain competitiveness (β=0.02; t=0.45; ns). Therefore, H_8 was supported while H_7 was rejected. Strategic sourcing was significantly related to information sharing (β=0.36; t=4.23; *p*<.001), yet was insignificantly associated with global supply chain competitiveness (β=0.01; t=0.24; n.s). Therefore, H_{10} was supported while H_9 was rejected. Finally, as expected, information sharing was positively and significantly related to global supply chain capability (β=0.58; t=7.50; *p*<.000). Hence, H_{11} was supported.

6.7.2 Testing Mediating relationship

The research model (Chapter 4) hypothesised that information sharing mediates the effects of five antecedents on the firm's global supply chain competitiveness. In order to test the mediation hypotheses, this study used Baron and Kenny's (1986) criteria to determine whether the conditions for mediation exist. Four conditions must be met to establish mediation. First, a direct link must be established between the independent and dependent variable; second, the independent variable must be associated to the mediating variable; third, the mediator must be significantly related to dependent variable when both the mediating variables are predictors of the dependent variable; and fourth, the relationship between the independent and dependent variable

must be significantly reduce when the mediator is added. While Sobel's (1982) z-test is one of the well known methods to test the significance of the mediation effect, this method may not be appropriate with small sample size and non-normal distribution (MacKinnon, Lockwood & Williams, 2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. An alternative procedure, bootstrapping procedure has been suggested to replace Sobel's z test of the indirect effect (Hair et al., 2014). Full mediation exists if the relationship between the independent and outcome variable, controlling for the mediator is not significant. Partial mediation however exists when the independent and outcome variable is significantly smaller when the mediator is in the model than when the mediator is not included in the model.

The mediation test consists of four steps (Table 6.14). The result for the mediation tests indicated that in the first step, for the full model, only organisational culture-fit and logistics integration commitment had positive effect on global supply chain competitiveness. However, in the sub-model tests, all five independent variables had an influence on global supply chain competitiveness. In sub model 1, technology capability, logistics integration commitment and organisational culture-fit had positive effect on global supply chain competitiveness at $p<0.001$; while trust and strategic sourcing had positive effect on global supply chain competitiveness at $p<0.01$. Therefore, condition 1 is met. In the second step, all five independent variables (technology capability, organisational culture-fit, logistics integration commitment, trust and strategic sourcing) affect information sharing, the mediator at $p<0.001$ in the entire sub models (Table 6.14), hence meeting the second condition of mediation. In the third step, the mediator - information sharing affects global supply chain competitiveness at $p<0.001$, hence meeting the third condition. In the fourthstep, information sharing was

significantly related to global supply chain competitiveness at $p<0.01$ (full model), and the effect of the independent variable was less in the fourth equation. The evidence is much clearer in the sub-model comparison between step 1 and four. Information sharing had a significant impact on global supply chain competitiveness in all five sub-models. With information sharing include in the model, the significant relationship between technology capability, trust and strategic sourcing in the second equation (sub-model) become insignificant in the third equation. For the effect of logistics integration commitment and organisational cultural-fit on global supply chain competitiveness even though it was still significant (partial mediation), it was less in the fourth step than in the firststep with the coefficients reduced, thus fulfilling the last condition of mediation. Hence, the results largely support H_{12} that postulates information sharing as a mediator between the five antecedents and global supply chain competitiveness.

Table 6.14: Mediation tests using PLS

	Full model		Model 1		Model 2		Model 3		Model 4		Model 5	
	B	t-value	B	t-value	β	t-value	β	t-value	β	t-value	B	t-value
H_{12} Mediation test: Step 1- Independent Variables to Dependent Variables												
GS←----TC	0.11	1.25	0.55	6.34***								
GS←----OC	0.53	6.41***			0.57	6.53***						
GS←----TR	0.09	0.92					0.23	2.24**				
GS←----LC	0.43	4.09***							0.51	6.12***		
GS←----SS	0.02	0.36									0.21	2.20**
	R^2 =0.41		R^2 =0.31		R^2 =0.41		R^2 =0.27		R^2 =0.29		R^2 =0.11	
H_{12} Mediation test: Step 2- Independent Variables to Mediator												
IS ←----TC	0.38	4.43***	0.42	3.99***								
IS ←----OC	0.25	3.11***			0.33	4.13***						
IS ←----TR	0.21	2.89***					0.28	3.22***				
IS ←----LC	0.41	3.92***							0.66	7.22***		
IS ←----SS	0.33	4.13***									0.42	4.01***
	R^2 =0.56		R^2 =0.41		R^2 =0.22		R^2 =0.17		R^2 =0.61		R^2 =0.41	
H_{12} Mediation test: Step 3 Mediator to Dependent Variable												
GS←----IS	0.77	8.21***										
	R^2 =0.66											
H_{12} Mediation test: Step 4 Independent Variables to Mediator to Dependent Variable												
GS←----TC	0.09	0.92	0.05	0.43								
GS←----OC	0.46	4.41***			0.37	4.41***						
GS←----TR	0.05	0.42					0.03	0.24				
GS←----LC	0.43	4.09***							0.31	4.02***		
GS←----SS	0.02	0.26									0.01	0.24
GS←----IS	0.67	7.33**	0.82	9.11**	0.77	8.21**	0.88	9.20**	0.70	8.01**	0.91	9.25**
	R^2 =0.51		R^2 =0.41		R^2 =0.45		R^2 =0.32		R^2 =0.30		R^2 =0.27	

Note ***p is significant at 0.001 level, **p is significant at 0.01 levelTC=technology capability, OC-organisational culture-fit, TR=trust, LC=logistics integration commitment, SS=strategic sourcing, IS=information sharing, GS=global supply chain competitiveness

6.8 Discussion of Findings

This study determines the pertinence of key variables – technology capability, organisational culture-fit, trust, logistics integration commitment, strategic sourcing and information sharing in influencing global supply chain competitiveness. Out of 11 direct hypotheses tested, only 7 were supported. Specifically, the PLS analysis demonstrated the role of technology capability, organisational culture-fit, trusts, logistics integration commitment and strategic sourcing as significant antecedents to information sharing, while global supply chain competitiveness are substantially supported by organisational culture-fit, logistics integration commitment and information sharing. In addition, the results also indicated that information sharing mediates the relationship between the five global supply chain capabilities and global supply chain competitiveness. The interpretations and inferences drawn from the results obtained in this study are discussed in subsequent sections.

6.8.1 Technology capability, information sharing and global supply chain competitiveness

The result from the structural model analysis indicated that the relationship between technology capability and information sharing, was supported (β=0.42; t=3.99; p<.001). The finding illustrated that information sharing among supply chain partners is a technologically oriented issue, which is motivated by advanced IT applications and other technological resources. Firms in the sample which possess technology capability are more willing to share information with their suppliers and customers, since they have the competence to leverage existing IT infrastructure and resources. Notwithstanding this, incompatibility of software and networking

systemscould lead to challenges and the need to maintain different technological standards with various supply chain partners (Ramamurthy & Premkumar, 1995). This finding is supported by prior empirical works conducted by Rajaguru and Matanda (2013). They found that firms which utilise advanced information systems such as electronic data integration (EDI) are reluctant to integrate and share information with network partners that use traditional XML-based Internet and basic information technologies. Without compatible systems, organisations are prone to build island of automation, limiting the scope and scale of information sharing potentials (Lin & Lin 2008).

Nevertheless, the findings highlighted that technology capability had no direct effect on global supply chain competitiveness (β=0.01; t=0.91; n.s). While prior empirical works highlighted that technology capability is needed to achieve superior supply chain capabilities (Siau & Tian, 2004), thepresent study demonstrated this factor to be insignificant. However, this study supports the possible influence of technology capability on global supply chain competitiveness through information sharing. This finding suggests that although the local manufacturing firms use information technology infrastructures that are congruent with a supply chain partners', and possess advances technological resources, information sharing is still a necessity to help maximise supply chain benefits. As a mediator, the information sharing facilitates in explaining why many firms that have invested heavily in information technology have failed to realise the benefits of these investments.

6.8.2 Organisational culture-fit, information sharing and global supply chain competitiveness

Consistent with prior empirical research, this study lends credence to the importance of organisational culture-fitin information sharing (Rajaguru & Matanda, 2013). The significant relationship between organisational culture-fit (β=0.54; t=6.33; *p*<.001) and information sharing as well as global supply chain competitiveness (β=0.51; t=6.44; *p*<.001) signified that effective knowledge and information exchange can emerge if partnering firms hold similar values, norms and beliefs. Commonality of interests, goals and business strategies generally will develop meaningful relationship, which encourages partnering organisations to share information (Chengalur-Smith et al., 2012). Given that firms in the sample consists of those that are doing business internationally, it is likely that insensitivity towards supply chain partners' culture and values can negatively influence inter-organisational information management and transfer as well as data-based decision making processes. A common identity and compatible philosophies is pertinent in avoiding lack of control of the dynamic environment. Moreover, as cultural compatibility promotes effective communication and knowledge exchange that inculcate shared goals, partnering firms require compatible cultures to attain a sustainable competitive advantage.

6.8.3 Trust, information sharing and global supply chain competitiveness

This study affirms prior empirical works (Wu, 2008; Yang et al., 2008), by confirming the need of trust element in information sharing (β=0.321; t=4.03; *p*<.001). This finding demonstrates that the firms surveyed are reluctant to transfer

and share data throughout the supply chain in the absence of trust. Since information sharing commonly requires firms to exchange strategic and operational data (e.g. demand forecast, product designs, capacity planning and research and development), factors that influence successful partnership, such as trust are rendered, in an effort to minimise risks of opportunistic behaviour (Mesquita & Lazzarini, 2010). Moreover, as information sharing often depends on information technology infrastructure, which mandates significant expenditure, and considered as a risky venture, therefore it can only be realised with good inter organisational trusts. Trust helps facilitate in building long-term stability of an organisation and willingness of partnering to sustain the information sharing practice. This finding is also supported by Crum and Palmatier (2004), which highlighted that most of the successful implementation of collaborative planning forecasting and replenishment effort lies on trust among the supply chain partners.

While trust appeared to be a significant factor for information sharing, this element was found to be not associated with global supply chain competitiveness (β=0.02; t=0.45; n.s). Despite the importance of trust as a factor that could encourage firms to transfer and share data as well as minimising risks of opportunistic behaviour, this element alone may be insufficient to have a direct effect on firms' global supply chain competitiveness. Instead, information sharing should take place to translate the benefits of trust into concrete firms' competitiveness. This is empirically supported by the mediating test result, which highlight the mediating role of information sharing between trusts and global supply chain competitiveness.

6.8.4 Logistics integration commitment, information sharing and global supply chain competitiveness

As predicted, this study found empirical support for the relationship between logistics integration commitment and information sharing (β =0.45; t=3.43; *p*<.001) as well as global supply chain competitiveness (β =0.51; t=3.95; *p*<.001). This is not surprising since the increasing global competition has driven firms in the sample to not only improve their internal operations, yet also concentrate on integrating their supply chain partners into the value chain processes. Such logistics integration commitment could enhance their capabilities to have a smooth production process and a well-coordinated flow of materials along the network. Yet, the cost and difficulties in coordinating might be overwhelming at times, eroding the comparative advantage of a network, encouraging firms to invest in information sharing practice as an effort to facilitate them in coordinating the global supply chain network. The alignment of forecasting and scheduling of operations among supply chain partners assist them in having better inter-firm coordination, which are often hindered by time and distance (Paulraj & Chen, 2007). Since the responding firms source and market their products globally, they require close coordination, and may regard information sharing practice more seriously.

6.8.5 Strategic sourcing, information sharing and global supply chain competitiveness

The findings of the study indicated that the relationship between strategic sourcing and information sharing, was supported (β=0.36; t=4.23; *p*<.001). The results demonstrated that information sharing need to be underpinned by strategic

sourcing. The finding is consistent with previous studies which suggested that the key to seamless information sharing is strategic partnership, including strategic sourcing (Wisser & Atzema, 2008; Olhager & Projogo, 2012). Unlike transactional relationship, firms engage in strategic sourcing often have a good understanding of each other's business processes and feature collaborative behaviours which could be translated into various forms, including information sharing. Strategic sourcing practice indicates that both supply chain partners have developed mutual trust aiming for achieving mutual benefits from their relationship. The finding suggests strategic sourcing has potentials which act as factor that determine the effect of information sharing. Since investing in technological infrastructure requires huge investment and sharing of sensitive data, strategic relationships are needed (Klein et al., 2007; Paulraj, Lado & Chen, 2008). Without a long-term commitment owing to an often overriding focus on price, opportunistic behaviour is encouraged, which may lead to unwillingness to share accurate data.

Surprisingly, this study however found insufficient empirical support for direct relationship between strategic sourcing and global supply chain competitiveness (β=0.01; t=0.24; n.s). While the direct effect results do not support the influence of strategic sourcing on global supply chain competitiveness, the result provides support for the possible influence of strategic sourcing through information sharing. Strategic sourcing might be useful in having access to some valuable information, yet, it might not be sufficient to facilitate organisations in improving their global supply chain competitiveness directly. While strategic sourcing could help firms in tapping and gaining access into suppliers' capabilities to design and develop major components and finished products, this advantage depends on the degree and the intensity of information sharing among supply chain partners. A closer

investigation on the types of information shared among firms and their supply chain partners in this study indicates that majority of the information shared are related to operational data, rather than strategic data. The information is associated with the day-to-day activities of the firms, including routines and necessary information for decision-making. This is supported by RBV, which affirm that strategic capabilities can only be reaped with efficient communication with suppliers through information sharing that gobeyond operational data (Manuj et al. 2013). Moreover, the desired outcome of strategic sourcing is to improve firms' competitive advantage through reduced costs, improved quality and delivery time; with much of these are accomplished by creating an environment where they trust each other. By having trusts, information sharing could be fostered and communication could be improved (Yang et al. 2008). Perhaps, the moderate levels of trusts among firms studied and their supply chain partners may act as a plausible reason for this finding.

6.8.6 Information sharing and global supply chain competitiveness.

The association between information sharing and global supply chain competitiveness is explored by H_{11}. This study affirms prior empirical works by Lee (2002) which demonstrated a significant relationship between information sharing and global supply chain competitiveness (β=0.58; t=7.97; p<.001). The finding suggests that information sharing provide capabilities that result in valuable operational benefits namely improved on-time delivery performance, reduced supply chain and inventory costs as well as increased productivity. By sharing information, the firms studied could increase their supply chain visibility, allowing them to perform activities more efficiently, satisfy the material requirements effectively, and plan their manufacturing and replenishment schedules better. With broader

information capabilities in play, firms could enhance their agility and flexibility; hence stand to gain operational benefits. This is particularly important for the responding firms as they are associated with larger geographic distances and more susceptible to unpredictable disturbances, implying longer lead time, which may lead to low service delivery. In a global supply chain, companies are commonly not in a contact with the end user, thus prohibiting them in accessing the actual market demand (Sajadieh, 2009). With reduced visibility, firms in a global supply chain network tendto maintain safety stock. Thus, by involving in information sharing with supply chain partners, they are no longer restrained by these challenges which could result in critical supply chain performance issues that severely undermine any international business initiative.

6.9 Conclusion

This chapter reports and discusses the findings of this study. Data collected were screened for missing cases, normality and outliers. Ten cases emerge as having incomplete data, in which the data were missing completely at random. Given this, this study therefore employed expectation maximisation (EM) algorithm to treat the missing data. Despite that there were several cases found to depart from normality, they were kept, as they generated moderate skewness and kurtosis statistics. Moreover, the use of PLS as statistical technique provides a robust method of analysis to reduce the impact of non-normality data distribution.

The results of the descriptive analysis of the responding companies reflect that majority of the samples were from electrical and electronic industry and are mainly characterised by small and medium enterprises. The assessment of measurement

model satisfies various validity and reliability criteria as well as common method bias issues, indicating that the constructs developed could be effectively analysed to test the structural model and the associated hypotheses.

Table 6.15 summarises the results of the various hypotheses in this study. While four hypotheses were not supported, the rest of the statistical results appear to reinforce the literature and provide additional meaningful findings. This study reveals a series of influential factors that may play different roles in different economic settings. Firms in the local setting are found to be more inclined to share information, if they possessan advanced information systems that are well integrated with their supply chain partners and relevant technological resources. They were also found to be more prone to information sharing in a collaborative environment based on trusts. Yet, this study highlights that firms in the sample may not gain global supply chain competitiveness if they fail to integrate information sharing in their business processes. The role of information sharing as a mediator facilitate in explaining why many local firms engage in international business fail to gain supply chain competitiveness. The findings highlighted that global supply chain competitiveness can be achieved and sustained through efforts at the firm level. However, the utilisation of basic transactional technology applications, moderate levels of trust and information sharing can encumber opportunities for desired outcomes. The implications of this study will be further discussed in the next chapter.

Table 6.15: Summary of Research Questions and Findings

Research questions	Research hypotheses		Results
RQ1 What are the global supply chain capability factors that would influence the global supply chain competitiveness of the Malaysian manufacturing firms?	H_1	Technology capability is positively related with global supply chain competitiveness	Not Supported
	H_3	Organisational culture-fit is positively related with global supply chain competitiveness	Supported
	H_5	Logistics integration commitment is positively related with global supply chain competitiveness	Supported
	H_7	Trust is positively related with global supply chain competitiveness	Not Supported
	H_9	Strategic sourcing is positively related with global supply chain competitiveness	Not Supported
	H_{11}	Information sharing is positively related with global supply chain competitiveness	Supported
RQ2 What are the global supply chain capability factors that would influence the information sharing practice of the Malaysian manufacturing firms?	H_2	Technology capability is positively related with information sharing	Supported
	H_4	Organisational culture-fit is positively related with information sharing	Supported
	H_6	Logistics integration commitment is positively related with information sharing	Supported
	H_8	Trust is positively related with information sharing	Supported
	H_{10}	Strategic sourcing is positively related with information sharing	Supported
RQ3 How does the information sharing affect the relationship between the five global supply chain capability factors nd global supply chain competitiveness?	H_{12}	Information sharing significantly mediates the relationship between the five antecedents and global supply chain competitiveness Notes: The relationship between organisation culture-fit and logistics integration commitment with global supply chain competitiveness are partially mediated by information sharing The relationship between technology capability, trust and strategic sourcing with global supply chain competitiveness are fully mediated by information sharing	Supported

CHAPTER 7: CONCLUSION

7.1 Introduction

This study investigates how the global supply chain capabilities of the local manufacturing firms affect theirglobal supply chain competitiveness and information sharing. Drawing from the Resource based view, Dynamic Capability Theory and Social Exchange Theory, this study build an integrated framework incorporating various variables explaining the role of organisational culture-fit, technology capability, trust, logistics integration commitment and strategic sourcing in influencing organisations' decisions to share information and reap global supply chain competitiveness. The study demonstrates that organisational-culture fit, logistics integration commitment have gradually become a significant component that affect the manufacturers in the local setting to achieve various global supply chain competitiveness. The role of information sharing as a mediator in this research also facilitate in explaining why many local firms engage in international businesses fail to gain global supply chain competitiveness despite of investing huge amount of resources in building information technology infrastructure, trusts and strategic relationships. This research promulgates that greater information sharing will be translated into enhanced firms' global supply chain competitiveness. Yet, local manufacturing firms are found to be more inclined to share information if they possess technological resources that are well integrated with their supply chain network members. They were also found to be more prone to information sharing practice in a collaborative environment based on trusts. They were more attracted to exchange information if they practice strategic sourcing and possess higher levels of logistics integration commitments. While the analyses detailed in the preceding

chapters contribute towards answering the research questions and hypotheses, as well as filling the gaps in the literature, this chapter highlights how the findings may contribute to existing knowledge and practical implications. This chapter further outlines the limitations of the research and suggests directions for future research.

7.2 Theoretical Contributions

This research sets out to contribute to the body of literature in many ways. First, this study extends our knowledge on the issues relating to global supply chain competitiveness from the perspectives of Malaysian home-grown companies. The study specifically brings together relevant literature streams from information technology, supply chain management and international business that are relevant in the manufacturing industry of developing countries, particularly Malaysia. In a rapidly evolving world of uncertainties, the global environment has made it increasingly difficult for local firms to sustain their competitive advantage. While researchers have begun to concentrate on global supply chain research over the last two decades, it appears that the majority of studies are conducted in advanced economic countries. With the majority of studies in this field are conducted in the developed nations, the findings may not be able to explain the same issue in different international environment, which have unique economy, culture and behaviour. This study therefore, improves our understanding by uncovering the existence of differences in the factors that may affect global supply chain competitiveness of a manufacturing firms that origins from different economic settings and levels of national industrialisation. While there are some dimensions proposed by the existing theories such as trust and strategic sourcing which are necessary to achieve global supply chain competitiveness, these factors alone may be insufficient conditions for

the local manufacturing firms to achieve competitiveness improvement. More specifically, these results of this study offer an alternative explanation for the inconclusive and sometimes conflicting empirical results. The findings broadly support the proposal that information sharing plays a mediating role between the different dimensions of theories proposed and global supply chain competitiveness. Yet, while these dimensions depend on information sharing as the mediating channel to extend their global competitiveness, different dimensions tended to have different levels of reliance on information sharing as the mediator.

Moreover, while the global supply chain research appears to spread across many industrial sectors, the applications of global supply chains are mostly done by large, multinational corporations rather than small and medium enterprises, particularly those that are locally owned. This study specifically addresses this gap by only focusing on local manufacturing firms and excluding the multinational corporations from our samples.

This study has also extend prior research by empirically investigated this issue through developing an integrated framework from several different theories which includeresource based view, dynamic capabilities theory andsocial exchange theory. With most of the existing researchers focus on resource-based view to explain structural and management issues in supply chains, it is believed that these studies are limited in scopes. By having an integrated framework that incorporates pertinent factors from various theoretical perspectives, this study is believed to be able to contribute to cumulating efforts within the research area of interest, and lead to the development of better discernment, which could exhibit greater explanatory power (Kuhn 1970).

Within the resource based view and dynamic capability perspectives, this study provides support that the key in improving a firm's performance relies on their internal resources and capabilities. Businesses need to also be able to work with supply chain partners in acquiring, deploying and reconfiguring resources within the firm and supply chain. Factors involving strategic decision-making and alliance management are critical to ensure that substantive capabilities can change to provide a sustainable competitive advantage. While the dynamic capability theory highlights the need for firms to increasingly seeking complementary resources and develops new capabilities through collaboration with other businesses, this study extends these views by demonstrating that some of these factors such as strategic sourcing and technological compatibility may not be able to lead firms in achieving envisioned benefits. Yet, the competitiveness of a firm's global supply chain may depend on the level of information shared, in which it acts as a strategic asset that individual business could leverage to create competitive advantage. Attaining competitive advantage not only requires technology, organisational culture-fit, logistics integration commitment and strategic sourcing, yet it needs effective sharing and deploying of information between supply chain partners. These are important in the case of manufacturing industry as the speed, flexibility and responsiveness of firms depends on the information shared. Given that there is evidence in regards to the intervention of information sharing as mediator, it is imperative for researchers to incorporate this in constructing future innovation adoption theoretical model.

Researchers have long suggested that relationships and social factors act as important source for the creation of the imitable value-generating resources that are inherent in a firm's network of relationship (Soosay et al. 2008). This assertion is based on a social exchange theory developed by Homans (1961) in the field of

sociology. With the growing importance of the role of business network in enhancing an organisation's competitive advantage, this theory has emerged as a prominent research area of strategic management. From the perspective of theory advancement, this study provides additional evidence to support the pertinence of relational factors by affirming trust as a key element in the information sharing practice in a global supply chain environment. High levels of trust contribute to strong technological collaboration practice, since this would encourage firms to share information with supply chain partners, resulting in a seamless and transparent network. Given that information sharing is a collective practice and consumes substantial organisational resources, it is unlikely that firms would be willing to invest in the absence of trust. Beyond the conceptualisation of Social Exchange Theory, this study however suggests that trust is not a significant factor in determining the global supply chain competitiveness. Instead, information sharing should take place to translate the benefits of trust into concrete firms' competitive advantage. Yet, it is premature to draw a definite conclusion, since this theoretical framework is only tested in the Malaysian context. Such contention reflects a compelling need to conduct future empirical research, adopting the integrated framework in a different emerging economy setting.

7.3 Implications for practice

Managers in the Malaysian manufacturing firms have to consider the strategic role of culture-fit, logistics integration andinformation exchange, in managing their global supply chains. Local manufacturing firms that compete in global arena cannot ignore the influence of organisational culture-fit on the value creations. Specifically, they need to understand their own organisational culture and the cultures of their

supply chain partners. This could help them formulate appropriate strategies to enhance the degree of integration and thus lead to improved capabilities. Often, good business relationships are formed not on the ground of explicit rules and regulations, yet a set of ethical habits, moral obligations that have become values and norms that are internalised by each of the supply chain partner; and this will translate into trusts, commitment and successful collaboration.

7.3.1 Logistics implication

Improving logistics process is very important for the local firms not only because it could help avoiding delays in delivery, yet it would also assist them in maintaining the quality of products and in complying with product safety requirements.This issue is particularly important for local manufacturing firms that compete in international markets. With increased geographical distance, the local manufacturing firms may face difficulties in maintaining and controlling the quality of goods produced. Poor performance in safety standards may results in suppliers being excluded from the chain. This is particularly important for local firms that are involved in producing perishable items. Hence, logistics integration commitment would facilitate firms in coordinating and integrating their logistics activities well with suppliers and customers, and is perceived to be crucial to the long-term success for local manufacturing firms that compete in international markets.

7.3.2 Information sharing implication

Global supply chain competitivenessis difficult to achieve without information sharing practice. By engaging in information sharing, various supply

chain activities such as warehousing, inventory management, logistics, and purchasing and customer service could be improved, while inefficiencies such as bottlenecks, lack of coordination and excess inventories can be confronted. Moreover, in global supply chains, the local firms are commonly not able to communicate directly with the end consumers making them lose touch with the actual market demands, which may be translated into wide swings, causing a bullwhip effect. Yet, with the mutual sharing of business and market information between supply chain partners, this issue could be resolved. The accurate information flows on actual demand will reduce the need for the manufacturing firms to carry large quantities of inventories to cater for the irregular supply and demand patterns.

Information exchange through sharing of customers and suppliers knowledge could also facilitate in speeding up the product development process and enhance process performance, leading to reduced time to market and enhanced customer value. These benefits would permit the local manufacturing firms to respond quickly to changing consumer demands. For instance, within the local food processing industry, the changes of lifestyle has resulted in increased demands for convenience food, highlighting the need for intense continuous innovations in the sector (Mohezar & Nazri, 2014). Willingness of firms to share information with supply chain partners presents immense opportunities for them to manage and support the product development process and increase their ability to be responsive to market requirements throug collaborative network. This could also help local firms in addressing the problem of inability to position them as part of the value chain.

In a global supply chain, firms may face hurdles entering the specific country's market as it may have unique demand patterns such as price, customer

service and order size. This phenomenon requires firms to make changes accordingly as to adapt their products to suit the country's local needs (Kotabe & Murray, 2004). Product specifications for instance, may vary from one country to another depending on the end-customers' requirements. As a consequence, it is expected that local manufacturers might have difficulties fulfilling customer expectations with respect to geographic, cultural and language distance. Hence, information sharing may appear to be an attractive strategy that could facilitate firms in enhancing their global supply chain competitiveness.

Sharing of information can also facilitate local manufacturing firms to improve their logistics process. The availability of information linkage could eliminate the need to conduct manual verification and validation of each product received. A lengthy process of physical examination of products that need to go through prior to enter a particular country, with more than one system of approving and inspection authorities take place may cause delay in product delivery and manufacturing process.

7.3.3 Strategic Sourcing implication

While it is commonly believes that strategic sourcing could enable firms to meet changing supply needs (Chiang et al., 2012; Khan & Pillania, 2008), which would allowthem to respond effectively leading to enhanced global supply chain competitiveness, local manufacturing firms need to consider participating in information sharing, as the results highlighted that without information sharing, it would be difficult for firms to gain benefits from strategic sourcing. Although strategic sourcing is expected to relate to improved flexibility and responsiveness,

such strategy depends on the level of information sharing. Without information sharing, firms may not be able to work effectively with suppliers as a result of incomplete information.

The impact of the strategic sourcing relies on the managers' ability to strategically position information sharing in the appropriate context, and reconfigure their purchasing function in a way that could reap the full potential. Such collaborative efforts can only be fully leveraged by the willingness of chain members to share information and knowledge; and proactive collaboration based on trust is needed for the information sharing practice to exist. Since local firms, especially SMEs are constrained by limited resources to enhance their technological advancement for information sharing therefore trusts could help them in entering alliances with supply chain partners to allow them to gain access to technological and financial resources for information sharing practice purposes.

Although close, long-term and trusting relationships could enable firms to have seamless network and information visibility, managers need to realise that this element alone may not facilitate them to enhance their global supply chain competitiveness. Yet, managers need to ensure that information sharing between their firms and supply chain partners are effective and smooth to assure that the effect of close network ties could be transferred into concrete competitiveness improvement. Information sharing also requires compatible work culture and practice. This requirement highlights the need for the managers of local manufacturing firms to ensure compatibility and congruency of values, goals and attitudes prior embarking on information sharing practice. Managers need to be attentive of supply chain members' need to continually adapt their business structures and system to ensure

culture alignment. They are also responsible for creating and promoting a business culture that facilitate information and information sharing.

While sharing information with supply chain partners can lead to enhanced global supply chain competitiveness, local manufacturing companies are found to be reluctant to share their strategic information. Perhaps, they may treat their strategic information as confidential owing to the competitive reason. Yet, on the whole, the quality of information exchanged could further be improved if they are also willing to share not only operational information, but also strategic information. They need to be transmitted on real-time basis and must be passed down accurately. The evolution of supply chain information technology has made it possible for the local manufacturing firms to access and process information more quickly across the supply chain. Nevertheless, the managers should also considering in adopting more advanced technologies with suppliers and customers to improve their competitiveness. For instance, rather than adopting merely on technologies such as computer aided design/computer aided manufacturing (CAD/CAM), managers need to deliberate on state-of-the-art technologies such as virtual manufacturing technology to help them in designing new products and shortening the product lifecycle. As a high and new technology, virtual manufacturing technology is far from being mature yet in developing countries including Malaysia (Liuan Nagurney, 2011). Investing in immature technology would help firms in sustaining their competitive advantage, as in line with the resource-based view theory.

While the information sharing practices in the local manufacturing industry involve commercial arrangements between firms in the private sector, there are various ways the public sector could foster such supply chain collaboration initiative.

Though information sharing is important in gaining global supply chain competitiveness, such strategy requires firms to invest heavily in advanced technology tools, resulting in high substantial costs which may seem to be obstacle for effective information sharing. The perseverance of the Malaysian government for research and development (R & D) and innovation in various manufacturing industry could be seen as a way to help these local firms which are notably lack of resources to envisage on information sharing effort. This financial assistance could be demonstrated through various economic incentives such as rebates, tax relaxation and technology grants. These supports are pertinent considering that some of the local manufacturing firms might be having difficulty in obtaining financing for technological innovations owing to the lack of proven track record. Such financing perhaps could facilitate firms to move into knowledge-based economy, and survive particularly during the economic slowdown asthe Malaysian manufacturing firms may face with difficulties with unexpected temporary financial difficulties during recessions. This is important especially for those local manufacturing firms that operate in international market, since this will help them to maintain their competitiveness in the face of price volatility.

7.3.4 Government initiative implication

To further ensure that the local firms are able to benefit from global supply chain operations, there is a need for the Malaysian government to coordinate joint-ventures between the local manufacturing firms and multinational corporations making it possible for them to gain from the strategic partnership. This initiative however needs to be coupled with a public policy that promotes critical learning that would bridge the knowledge and skill gaps. More emphasise should be given on the

joint-venture arrangements that focus on technology transfer that are considered to be strategic to the development of local manufacturers. This is important as majority of MNCs often use developing countries as production facilities, and prefer to maintain their R & D activities in their home countries (Prajago et al., 2007). A deeper economic collaboration and cooperation which could translate into information sharing practice could also be fostered through the government's active participation in the World Trade Organisation as well as other regional seminars and programmes. This strategy is pertinent in nurturing relationship that goes beyond transactional since the level of information sharing was determined by the level of strategic relationship between supply chain partners.

The importance of information sharing especially for logistics coordination is important to maintain global supply chain competitiveness tendering the government to further enhance the sector's productivity through automation. Information sharing can be through various information technology applications for instance may be able to cut off the lengthy process of physical examinations of products. The availability of information linkage may smooth the logistics operations and reduce delays in material delivery, a common problem facing by local firms.

Considering that Malaysia is an emerging economy and still in its early growth stage, industry association could also play a role in fostering the information sharing practice in the country's manufacturing sector. The Federation of Malaysian Manufacturer (FMM), which corresponds to the local manufacturing firms for instance, may initiate collaborating practice with international firms that develop electronic communication globally such as Global Solution 1 in developing and promoting specific standards to help enhancing technological compatibility between

local firms and their international counterparts. Various seminars, conferences and workshops may also serve as a good platform to inform local manufacturing firms on the pertinent role of information sharing in streamlining their operations and eliminating barriers that affect their ability to gain global supply chain competitiveness.

Figure 7.1: Global supply chain competitiveness Model

7.4 Limitations

This study has several limitations, which must be taken into account in interpreting the results and their implications. First, as the research conducted only focus on Malaysian manufacturing firms, there may be certain individual attributes of local organisations that might not apply to other developing countries, limiting the generalisability of the results. Moreover since the sampling frame was obtained from

the Federal Malaysian Manufacturer, in which the population is restricted only to the manufacturers that are registered with the association, the results of this study may suffer from some degree of external validity. The low response rate may also compromise the validity of the findings. Yet, this study has conducted an assessment of non-response bias by comparing the responses between the early and late respondents using an independent t-test (Armstrong & Overton, 1977; Lambert & Harrington, 1990), and found that this bias did not exist in the dataset.

Second, since this study collected cross-sectional data, causality inferences were difficult to establish (Pinsonneault & Kraemer, 1993). As this type of research design measures the predictors and outcome at one point in a time, it is possible that this study did not effectively tap the full benefits of the information sharing on global supply chain competitiveness.

Third, the reliance on self-reported global supply chain competitiveness may be subject to potential bias. While the self-reported data are usual in past researches examining management behaviour, and is argued to be valid when these competencies are measured using structured rating instrument (i.e. survey) (Chandler & Jansen, 1992), it is likely that the respondents may rate their performance as favourable, as they want to present a better company image to others. Nevertheless, in this study a Harman's single-factor test and single method approach suggested by Podsakoff et al. (2003) was conducted to determine the existence of common method bias. The results however, indicate that common method bias is not a significant issue in this study.

Since information sharing practice in the Malaysian manufacturing sector is rather limited, this study only considers first-tier supply chain partners to the respondent firm in investigating the issue. While the information sharing and collaborative initiatives can extend to second and third-tier suppliers, we do not know if those efforts would result in significant differences in individual firm's global supply chain competitiveness. This study also perceives that the entire industrial sector of Malaysia has firms that have homogeneous operating features, but in reality, different sub-sectors faces with different operating conditions within the same environment due to various reasons that may include the type of products, or services they offer; or the technology in used for the production processes, and its level; etc. There is a need for the replication of this study on the basis of different sub-sectors to identify the best practices for each sub-sector. This may prove useful in accelerating the development of individual sub-sectors in the industrial sectors of countries, like Malaysia, where resources are found to differ far from one sub-sector to another.

7.5 Directions for future research

The study presented provides avenues for future research. The scope of information sharing in supply chains should be examined deeper by incorporating larger sample size from different sources of database. Rather than focusing solely on a particular developing country, future studies should conduct research in various emerging economy countries so as to increase the generalisation of the findings.

As firms mature in the use of technologies, upcoming research would benefit more from longitudinal approach of data collection as this technique would allow a more fine-grained exploration of how the predictors and impact of information

sharing change over time. There may also an opportunity to explore the differential impact of each technology used for information sharing and the firm's subsector on the relationship between information sharing and global supply chain competitiveness.

Another interesting avenue of investigation would be to explore the impact of information sharing from a dyadic perspective, or perhaps an extended supply chain. An individual firm's global supply chain competitiveness may not necessarily contribute positively to the performance of the chain as a whole, because an individual improvement can be detrimental to others (Van Der Vorst, 2006). Conflicting interests of different firms in the chain may complicate the willingness to share information. Individual firms may have their own information strategy agenda that they pursue in isolation and in the absence of consideration for suppliers and customers (Aramyan, Ondersteijn, Van Kooten & Lansink, 2006).

7.6 Conclusion

Improved opportunities to access new markets and seek strategic assets as well as reduced operational costs have spurred interests in global supply chain practice among developing economies' manufacturing firms including Malaysia. The new supply chain structure allows firms to take advantage of the unique comparative advantage of differing nations have to offer. Yet, since global supply chains are associated with larger geographical distance, higher economic and political risks as well as language and communication barrier, they are more difficult to manage as compared with the domestic network. Such issues require the local manufacturing firms to become more responsive to support more flexible and leaner manufacturing

environment. This study provides support that organisational culture-fit, logistics integration commitment and information sharing facilitate the local manufacturers to attain global supply chain competitiveness. As compared with the developed countries, the manufacturing companies from emerging economy such as Malaysia do not depend solely on trust, technology capability and strategic sourcing practice to gain their global supply chain competitiveness. Yet, information sharing should take place to translate the benefits of having such elements into concrete firms' competitiveness. The level of information shared acts as a strategic asset that individual firm could leverage to create and sustain competitive advantage. These are important in the case of manufacturing industry, in which firms are increasingly competing in business environments characterised by short product lifecycle and volatile demand patterns. In keeping pace with the challenges created by intense globalisation, local manufacturers therefore must look for new capabilities to increase their planning capacity and improve customer service. The benefits arising from global supply chain could not be realised without information sharing.

This research enhances our understanding of how the local manufacturing companies from developing countries, specifically Malaysia can gain and sustain their global competitiveness through managing their global supply chain capabilities. This study empirically demonstrates how various technological, organisational, and relational factors could shape global supply chain competitiveness. Nevertheless, there are some limitations concerning the research methodology issues which need to be addressed in future research. Despite these, it is believed that this study offers important implications for supply chain research and practice by providing information on the global supply chain capabilities and competitiveness as well as information sharing practice of local manufacturing firms.

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2. Sidah IDRIS & Suhana MOHEZAR Ali (2015). Manufacturing Global Supply Chain Management. **16th Eurasia Business and Economics Society Conference (EBES). Istanbul, Turkey.**

3. Sidah Idris (2012). Global supply chain management; Harmonizing country factors. **The 5th International Borneo Business Conference (IBBC). Tawau, Sabah.**

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